DRAFT
ENVIRONMENTAL IMPACT STATEMENT

FOR THE

SEATTLE COUNTRY DAY SCHOOL EXPANSION AND REDEVELOPMENT PROJECT

Prepared for:

Seattle Department of Planning and Development

Prepared by:

Adolfson Associates, Inc.
5309 Shilshole Ave. NW, Suite 200
Seattle, WA 98107

July 12, 2004

City of Seattle

Gregory J. Nickels, Mayor
Department of Planning and Development
D. M. Sugimura, Director

July 12, 2004

To: Recipients Of The Draft Environmental Impact Statement
For The Seattle Country Day School Expansion And Renovation Project

From: Colin Vasquez
Seattle Department Of Planning And Development

This Draft Environmental Impact Statement (Draft EIS) discusses the potential environmental impacts that could result from redevelopment of the educational facilities at Seattle Country Day School. The school is proposing the project to eliminate the constraints on educational opportunities posed by the existing school facilities.

The proposed project includes construction of two new 2-3 story academic buildings, parking areas, playfields, and a new access driveway to the school, as well as renovation of existing structures. The project will be constructed in two phases, with four to ten years between phases. The proposed project will expand the facilities from approximately 43,000 square feet of classroom and administrative space to 63,500 square feet at the end of Phase 1 and 77,000 square feet at the end of Phase 2. In addition, a 10,000 square foot, single story parking garage will be constructed in Phase 2 beneath one of the buildings. Five to six single-family homes owned by the school would be demolished.

Three alternatives are evaluated in this Draft EIS. The alternatives include the school's Preferred Alternative (Alternative 1), an alternative that would reduce lot coverage but require demolition of an additional single-family residence (Alternative 2), and the No Action Alternative (Alternative 3).

As part of the environmental review process, the Department of Planning and Development (DPD) sought public comment on the scope of the environmental analysis. Based on that process, DPD determined that this Draft EIS would evaluate the following elements of the environment:

- Earth
- Land Use
- Aesthetics
- Transportation
- Construction Impacts

The impacts resulting from each alternative and mitigation measures are summarized in Table 1-4 of this Draft EIS.

During the 45-day review period for this document, DPD will conduct a public hearing to receive comments on the Draft EIS. The hearing will be for public comment on the Draft EIS only. No presentations will be made. Information on the public hearing is as follows:

Date of Hearing:	August 17, 2004
Time:	6:30 – 9:00 p.m.
Location:	Queen Anne Community Center
Address:	1901 First Avenue West Seattle, Washington 98119

Written comments on the Draft EIS are welcome. The comments should include the name and address of the author and the specific comments on the Draft EIS. Address comments to:

Colin Vasquez, Land Use Planner
Seattle Department of Planning and Development
700 5th Avenue, Suite 2000
P.O. Box 34019
Seattle, WA 98124-4019
Telephone: 206-684-5639
FAX: 206-233-7902
colin.vasquez@seattle.gov

The deadline for receipt of written comments and materials on the document is

August 26, 2004 5:00 p.m.

After the public review period, DPD will issue a Final EIS that incorporates or responds to comments submitted during the review. The Final EIS, along with the Administrative Conditional Use application, and Variance application, will be used by DPD to evaluate Seattle Country Day School's proposal. A public meeting will be held on the Administrative Conditional Use application and Variance application before DPD makes a decision on the project. Appropriate advance notice will be given for the meeting. The school's proposed schedule calls for construction of Phase 1 to begin in June 2005 with completion in August 2006. The estimated start for Phase 2 construction is proposed for June 2009.

Four key environmental issues are related to the proposed expansion of the school facility— construction near a designated environmentally critical area (steep slope); the change in land use from residential property to institutional uses, including demolition of single-family structures; the bulk and scale impact of the proposed new school buildings; and the modification of immediate traffic circulation that would result from construction of a new access drive. Short-term impacts that could affect the surrounding predominately residential neighborhood include noise, odor, dust, and construction vehicle traffic associated with construction phases of the project.

FACT SHEET

NAME OF PROPOSAL

Seattle Country Day School Expansion and Renovation

PROPONENT

Seattle Country Day School
2619 Fourth Avenue North
Seattle, WA, 98109

PROJECT DESCRIPTION

The proposed action is an expansion and redevelopment of the existing facilities at the Seattle Country Day School, an independent kindergarten through eighth grade (K-8) school located at 2619 4th Avenue North in Seattle. The proposed project includes construction of two new 2-3 story academic buildings, parking areas, playfields, and a new private access driveway for the school, as well as renovation of existing structures. The project will be constructed in two phases, with four to ten years between phases. The proposed project will expand the facilities from approximately 43,000 square feet of classroom and administrative space to 63,500 square feet at the end of Phase 1 and 77,000 square feet at the end of Phase 2. In addition, a 10,000 square foot, single-story parking garage will be constructed beneath the new building. There would be 54 surface parking spaces with Phase 1, and 60 garage and surface parking spaces for Phase 2.

Phase 1 construction is proposed to include a new 2-3 story, 20,700 square foot middle school building, a new access driveway from 4th Avenue North to provide automobile pickup and drop off and access to parking, and renovation of existing facilities. As part of Phase 1, five of six single-family homes owned by Seattle Country Day School would be demolished. In Phase 2, a new 26,200 square foot classroom and administrative wing would be added along with a 29-car parking garage. Existing playfields and parking would be relocated as part of Phase 2. Under one of the alternatives (Alternative 2), a sixth single-family home owned by the school would be demolished as part of Phase 2.

Redevelopment of the facilities at Seattle Country Day School is intended to enhance the education facilities at the school, to develop a new access point and improve drop-off and pick-up, and to increase parking facilities. Seattle Country Day School believes its curriculum is currently constrained by space limitations and outdated facilities.

Three alternatives are presented in this document. These include the school's Preferred Alternative (Alternative 1), an alternative with slightly reduced lot coverage but demolition of an additional single-family residence (Alternative 2), and a No Action Alternative (Alternative 3). In addition, several alternatives that were considered but rejected by the School are briefly

described. Phase 1 construction is proposed to start in June 2005 and be completed in August 2006. Phase 2 construction is proposed for June 2009.

LEAD AGENCY

City of Seattle Department of Planning and Development (DPD)

RESPONSIBLE OFFICIAL

Bob Laird, Operations Director
Department of Planning and Development
700 Fifth Avenue, Suite 2000
Seattle, WA 98104-5070

CONTACT PERSON

Colin Vasquez, Land Use Planner
Department of Planning and Development
P.O. Box 34019
Seattle, WA 98124-4019
Phone: 206-684-5639
Fax: 206-233-7902
Email: colin.vasquez@seattle.gov

PENDING APPLICATIONS

Master Use Permit No. 2302435

GOVERNMENTAL ACTIONS

During the SEPA process, DPD is reviewing the Master Use Permit (MUP) application for the proposed Seattle Country Day School expansion and redevelopment. The Master Use Permit application (MUP) includes a variance for lot coverage and an administrative conditional use. The SEPA document and Master Use Permit application will be used by DPD to evaluate and make a decision on the SCDS proposal.

REQUIRED APPROVALS

Preliminary investigation indicates that the following permits and/or approvals could be required for expansion and redevelopment of the school facilities. Additional permits/approvals may be identified during the review process associated with development of specific components of the proposal or alternatives. One SEPA review and MUP application are being prepared for the two phases of the project, but construction permits and approvals would be prepared separately for Phase 1 and Phase 2.

City of Seattle Department of Planning and Development

- Master Use Permit, Administrative Conditional Use, and Variance
- SEPA review
- Demolition Permit
- Tenant Relocation License
- Mechanical Permit
- Electrical Permit
- Grading Permit
- Building Permit

City of Seattle Department of Transportation

- Street Improvements (sidewalk alteration, curb cuts, etc.)
- Coning Plan for Nob Hill Avenue North
- Shoring Permit

AUTHORS AND PRINCIPAL CONTRIBUTORS

The Seattle Country Day School EIS has been prepared under the direction of the Seattle Department of Planning and Development. Research and analysis were provided by:

Adolfson Associates, Inc.: Lead EIS consultant, project management, earth, land use, aesthetics, construction impacts

Heffron Transportation, Inc.: Transportation

AMEC Earth & Environmental Inc.: Geotechnical

Carlson Architects: Site Design

LOCATION OF BACKGROUND DATA

Department of Planning and Development
700 Fifth Avenue, Suite 2000
Seattle, WA 98104-5070

DATE OF ISSUE

July 12, 2004

END OF COMMENT PERIOD

August 26, 2004

PUBLIC HEARING

A public hearing to receive comments on the Draft EIS will be held on Tuesday, August 17, 2004, from 6:30 to 9:00 p.m., at the Queen Anne Community Center.

AVAILABILITY OF THE DRAFT EIS

Copies of the Draft EIS and/or Notices of Availability have been distributed to a number of agencies, organizations, and individuals as noted in the Distribution List located in Chapter 5.

Copies of the Draft EIS are available for review at the DPD Public Resource Center located in Suite 2000 of the Key Tower in downtown Seattle (700 Fifth Avenue). Copies of the EIS are also available at the following public libraries:

Central Library
1000 4th Avenue
Seattle, WA 98104-1109
(206) 386-4636

Fremont Branch
731 N. 35th Street
Seattle, WA 98103
(206) 684-4084

Queen Anne Branch
400 W. Garfield
Seattle, WA 98119
(206) 386-4227

Seattle Pacific University
3226 Sixth Avenue West
Seattle, WA 98119
(206) 281-2228

Supporting documentation is also available for review at the DPD Public Resource Center.

A limited number of complimentary copies of the Draft EIS may be obtained from the DPD Public Resource Center while the supply lasts. Additional copies may be purchased for the cost of reproduction. Copies in alternative format can also be made available. In addition, a copy of the document is available on the DPD web page at http://www.seattle.gov/dpd/notices/.

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CHAPTER 1.0 BACKGROUND AND SUMMARY

Seattle Country Day School proposes to expand and redevelop its existing school facilities located on the north-facing slope of Queen Anne Hill in Seattle. The independent school currently accommodates kindergarten through eighth grade students. The school proposes to construct new buildings to provide additional classroom, laboratory, and common spaces. A primary goal of the expansion is to provide separate middle school facilities that address the academic and social needs of middle school students.

1.1 Environmental Review: Purpose of the Draft EIS

This Draft Environmental Impact Statement (Draft EIS) has been prepared in compliance with the State Environmental Policy Act (SEPA, Chapter 43.21C, Revised Code of Washington (RCW)); the state SEPA rules (Chapter 197-11 of the Washington Administrative Code (WAC)); and Seattle's Environmental Policies and Procedures Code (Chapter 25.05, Seattle Municipal Code (SMC)).

The Draft EIS is an information document, ensuring that environmental impacts and mitigation measures for the proposed expansion and redevelopment alternatives are disclosed to the public, agencies, decision makers, and other interested parties. It evaluates the long-term direct, indirect, and cumulative impacts of the alternatives, as well as shorter-term construction-related impacts. The Draft EIS is one of several documents and sources of information that will be considered in the decision-making process for this project.

1.2 Existing Conditions at Seattle Country Day School

Seattle Country Day School is an independent school for grades kindergarten through eighth (K-8). The school is located on the north-facing slope of Queen Anne Hill. The school-owned property is bounded by 4th Avenue North on the east, Newell Street on the north, and private, residential property on the west and south (see Figure 1-1). The site can also be accessed by Nob Hill Avenue North, which dead ends at the original 1928 building.

The school is located in a residential area that is primarily single-family. Multi-family residences are located to the east across 4th Avenue North. The larger area surrounding the school is primarily residential. Commercial/business property is located on Nickerson Street approximately two blocks north of the school site. Seattle Pacific University is located approximately 5 blocks to the northwest.

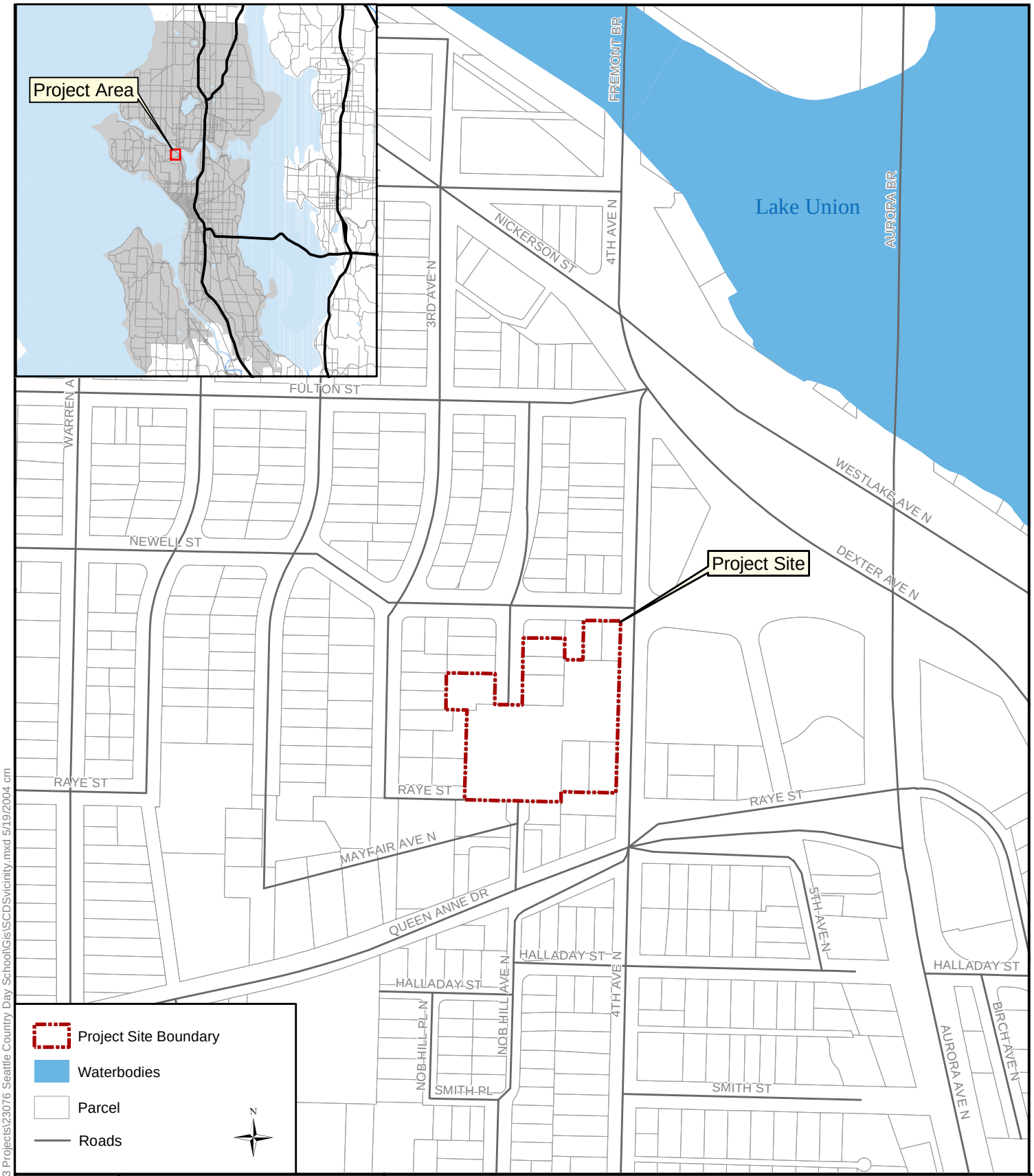
A school has existed on the Seattle Country Day School site since 1928, when a building was constructed for the Seattle Junior Academy. From 1973 to 1975, the building housed a Seattle School District alternative program for high school students. Seattle Country Day School was established in 1964 and was originally located in Burien. In 1975 the school relocated to the Seattle Junior Academy Building at Nob Hill Avenue North. The original 1928 building is still in place and is used by Seattle Country Day School. There have been several facility expansions

at the school site in recent years. See Figure 1-2 for a view of existing facilities. In 1982, the Math and Science Building (Building 3) was constructed. The 1928 building was expanded in 1984 to include new classrooms and a library. In 1994, the Math and Science building was expanded to house the middle school. Over the years, the school has acquired six single-family residences on Newell Street and Nob Hill Avenue North. The school uses house 1 for administrative purposes and rents houses 2, 3, 5, and 6 to tenants for residential use (Figure 1-2). Until recently the school also used House 4 for administrative purposes. the building is now vacant.

Existing buildings and facilities on the site consist of:

- The original two-story building constructed in 1928 with a 1982 two-story classroom and library addition. The building includes 22,274 square feet of space and houses 12 classrooms for grades K-3, administrative offices, a lunchroom, and the library.
- A gymnasium built in 1953, with a two-story classroom annex. The building is 7,802 square feet in area and houses two classrooms for second grade and the gymnasium.
- A 3-story middle school building constructed in 1982, with a 1994 addition. This 12,956 square foot building houses 13 classrooms for grades 4 through 8.
- One house owned by the school is used for school office space. Until recently another house was used for school storage. The school owns four other houses on the block that are residential rentals.
- A small, dilapidated greenhouse on the north slope of the property.
- A play area located on the south side of the property between the original building, the gymnasium, and the steep slope.

School enrollment and staffing at Seattle Country Day School, like at other schools, varies somewhat from time to time due to a variety of factors. The current enrollment, as reported by the school to DPD in November 2003, is 305 students. There are 228 students in grades K through 5 (including 39 fifth graders) and 77 middle school students. There are currently 56 full and part time faculty and staff. The school is in the second year of an 8-year plan to reorganize its grade structure to stabilize middle school enrollment and prevent fluctuations in middle school enrollment caused by students leaving for other schools at sixth grade. The reorganization includes temporary increases in third, fourth and fifth grade enrollment. Under the reorganization, enrollment may increase by 23 students and staff by five over the current total enrollment. The school expects this enrollment increase to be temporary—the school plans to reduce enrollment in the third, fourth, and fifth grades if the middle school retention continues to improve as it has in recent years. This temporary enrollment increase would occur with or without the proposed project and is scheduled to end after the 2009to 2010 school year. No additional enrollment increase is proposed as a result of the expansion project.



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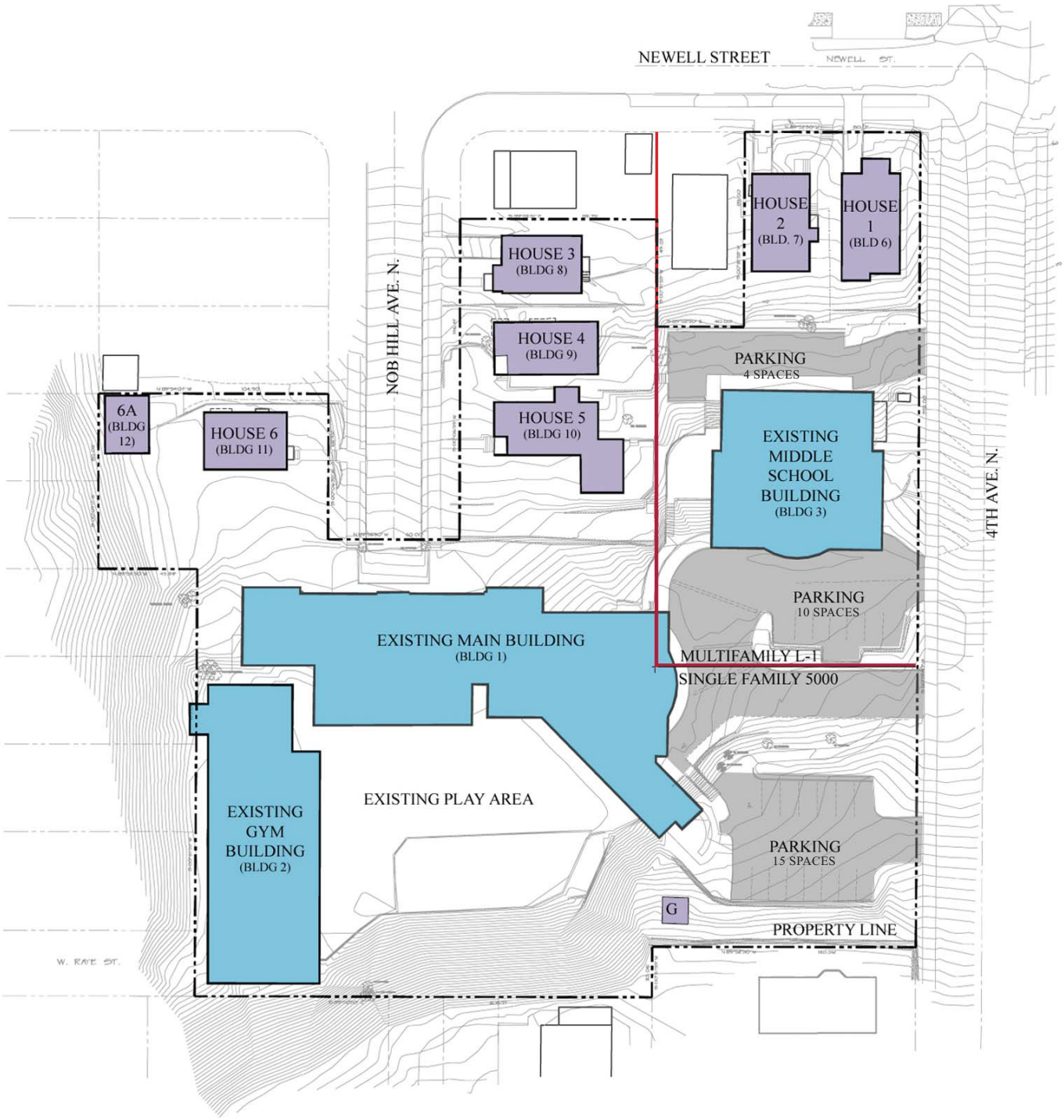
Map data shown are the property of the sources listed below. Inaccuracies may exist, and Adolfson Associates, Inc. implies no warranties or guarantees regarding any aspect of data depiction.

Source: King County GIS, 2003
Department of Planing and Development, 2001

FIGURE 1-1.
PROJECT VICINITY
SEATTLE COUNTRY DAY SCHOOL EXPANSION
SEATTLE, WASHINGTON



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NORTH
No Scale

File name: Fig1-2.ai
Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 1-2.
EXISTING SCHOOL PROPERTY
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

School enrollment at Seattle Country Day School has increased in the past 20 years. The average growth increase has been 3.95 percent per year. The school has reported the following enrollment numbers to DPD.

Table 1–1. Seattle Country Day School Enrollment: 1980-2004.

School Year	Student Enrollment	Percent Change by Year
1979-1980	173	-
1980-1981	171	-1.2%
1981-1982	170	-0.6%
1982-1983	184	+8.2%
1983-1984	171	-7.1%
1984-1985	175	+2.3%
1985-1986	200	+14.3%
1986-1987	206	+3.0%
1987-1988	210	+1.9%
1988-1989	222	+5.7%
1989-1990	247	+11.3%
1990-1991	263	+2.4%
1991-1992	261	+3.2%
1992-1993	256	-2.0%
1993-1994	276	+7.8%
1994-1995	290	+5.1%
1995-1996	289	-0.3%
1996-1997	291	+0.7%
1997-1998	295	+1.4%
1998-1999	303	+2.7%
1999-2000	284	-6.3%
2000-2001	286	+0.7%
2001-2002	303	+5.9%
2002-2003	303	0%
2003-2004	305	+0.7%
Total Percent Change in Enrollment from 1980 to 2004		+76.3%

The school day at Seattle Country Day School begins at 8:15 for the middle school (Grades 6 through 8) and at 8:30 for the lower grades, with parent drop-off from 7:30 to 8:30 a.m. Afternoon pick-up begins at 2:50 p.m. with dismissal for grades K through 3. The dismissal for grades 4 through 8 is at 3:10 p.m. Most students leave the school by 3:30 p.m. There is also an extended-day program offering childcare for students before and after school. The morning program operates between 7:30 and 8:30 a.m., with drop-off occurring between 7:30 and 8:00

a.m. There are approximately 20 students in the before-school program. About 55 students participate in the afternoon program that operates between 2:50 and 6:00 p.m. Pick-up for these students is typically between 4:00 and 6:00 p.m.

School faculty and staff arrive between 7:30 and 8:30 a.m. Faculty and staff leave the school between 3:00 and 6:30 p.m. with most leaving between 4:00 and 5:00 p.m.

The existing area for student pick-up and drop-off is located in the parking lot adjacent to 4th Avenue North at the school's main entrance (see Figure 1-2). This area can accommodate approximately seven vehicles at one time. This limited pick-up and drop-off area causes vehicles to back up onto 4th Avenue North and onto Newell Street during peak periods. For more information on pick-up and drop-off, see the discussion in the Transportation section (3.4) or the Transportation Technical Report in Appendix C.

Seattle Country Day operates on a calendar similar to other independent and public schools in Seattle. The school year begins within a few days after Labor Day and typically ends the second week of June. There is a two-week winter break around the Christmas and New Years holidays and a one-week spring break in April. The school observes the typical holidays and has approximately three in-service days when most students are absent from the school. Forty to 50 students participate in the extended day programs on in-service days. On these days student pick-up occurs between 4 and 6 p.m. There are nine half days per year—before winter, spring, and summer breaks and for the six days of parent conferences in the fall and early spring. Participation in the extended day programs is very light on early release days prior to vacation breaks. On early release days associated with parent conferences, larger numbers of students participate in the extended day programs until the normal dismissal times with the number of participants tapering off through the late afternoon. Currently there are no school programs during the summer, but there have been in the recent past. The school conducts summer programs based on need and staffing and on what physical renovations are taking place at the school during the summer.

In addition to regular school activities, the school has approximately 35 special events each year. These have a range of attendance. Small events include storytelling with about 12 attendees and parent education events with 30 attendees. There are approximately 14 annual events that draw over 100 persons. These are summarized below:

Table 1–2. School Special Events that Draw Over 100 Attendees

Event	Attendance	Date/Time
Chess tournament	400 students/adults (includes participants from other chess clubs in the Seattle/Tacoma area	Usually in March/all-day Saturday tournament
Annual Concert	300 adults/200 students	Winter or spring evening/7 to 9 p.m.
Auction	350 adults	Spring/held off-site
Graduation	150 adults/30 students	June evening/7 to 9 p.m.
Crazy Carnival	200 students/100 adults	Saturday in the spring/11 a.m. to 4 p.m.

Event	Attendance	Date/Time
Grandparents Day/Special Friends Day	250 adults	Weekday date varies from year to year/morning or afternoon
Middle School Dances	225 students/10 adults	One each Fall, Winter and Spring/Friday 7:30 to 10:30 p.m.
Admissions Open House (public)	200 adults	Winter weekend day/2 hours
Grades 2-3 Open House	160 Adults	September evening/6 to 8 p.m.
Grades 4-5 Open House	170 adults	October evening/6 to 8 p.m.
Middle School Admissions Open House (public)	75 adults/students	September evening/6 to 8 p.m.
New Family Social	150 adults/75 students	Late Spring/7 to 8 p.m.
Grades K-1 Academic Open House	140 adults	October evening/6 to 8 p.m.
Middle School Academic Open House	120 adults	September or October evening/7 to 9 p.m.

The school has three on-site parking lots—one located north of the middle school, one area east of the main building, and one up the hill and southeast of the lower school (see Figure 1-2). Parking spaces and facilities are summarized below in Table 1-3.

Table 1–3. Existing Parking Facilities

Lot Location	Number of Spaces	Other Facilities
North of Middle School	4	None
East of Main Building	10	Drop off and pick up area; one space used for school bus; one handicapped space
Southeast of Main Building	15	One handicapped space

Most of the 56 faculty and staff travel to and from school in private vehicles and park either on-site or in on-street parking spaces near the school. There are approximately 30 visitors a day to the school who also park on-site or near the school. There are approximately five deliveries to the school per day. Most deliveries load and unload at the student pick-up and drop-off zone, located in the middle parking lot adjacent to the middle school building (Figure 2-1). Food deliveries unload from Nob Hill Avenue in order to access the lunchroom in the Main Building. The school does not provide bus service for students, but does use charter buses to pick up and drop off students for special off-site events and field trips. This occurs approximately 40 times per school year. Buses cannot load and unload in the school's drop-off/pick-up area because the turning radius of the area is too small. The buses typically stage on Newell Street or Nob Hill Avenue North. For more information on parking and bus trips at the school, see the Transportation Section, 3.4, or the Transportation Technical Report in Appendix C.

1.3 Objectives for School Expansion and Redevelopment

Seattle Country Day School proposes the project because it believes existing facilities constrain educational opportunities. According to the school, numerous scheduling conflicts occur because there are inadequate classrooms, multipurpose areas, and lunch facilities. Several teachers do not have their own classrooms and have to carry equipment between classes. Students only have physical education twice a week because of limited facilities. Some student lunch periods begin as early as 10:45 a.m. so that the cafeteria can accommodate all students. A major limitation is that the existing middle school building is inadequate for students of that age. Classrooms are small and laboratory facilities are limited. There is no common area to allow middle school students to socialize. The existing buildings do not have a centrally located administration area, which makes welcoming parents and visitors difficult and causes safety concerns. There is inadequate on-site parking and no queuing space on-site for drop-off and pick-up of students. Traffic backups on adjacent streets and conflicts with neighbors occur as a result of existing queuing and parking conditions.

In order to resolve the school's space and other limitations, Seattle Country Day School has developed the following redevelopment objectives:

- Construct a separate, dedicated middle school building with adequate classroom and laboratory space and with appropriate common areas;
- Add additional playground spaces;
- Create a centralized administration area at the main school entrance;
- Construct an access drive and queuing area from 4th Avenue North with a new student drop-off/pick-up area;
- Increase parking spaces on-site;
- Renovate existing facilities to increase classroom size and improve the gymnasium and cafeteria;
- Provide larger classrooms by constructing new, larger classrooms and moving students into the larger rooms; and
- Improve accessibility to all facilities.

1.4 Summary of EIS Scoping Process

The scope of the environmental elements analyzed in this Draft EIS was determined using a formal, public EIS scoping process as required by City and state SEPA regulations. As part of this process, the City held a public scoping period from September 25, 2003 to November 11, 2003. Notice of the scoping meeting was published in the Seattle Daily Journal of Commerce and in the Department of Planning and Development (DPD) Land Use Informational Bulletin that is posted on the DPD web site and mailed to subscribers. Notifications of the proposed project and the public scoping meeting were mailed to over 450 addresses on the DPD mailing list, including residents of the area surrounding the school.

Several members of the public spoke at the scoping meeting which was held on October 15, 2003. Seventy-five to 100 people attended, along with DPD staff and consultants. Over 75 written comments were received during the scoping period.[1]

Major issues raised at the scoping meeting and in written comments received during the comment period include:

- Traffic and Parking: concerns over the impacts of the proposal on traffic congestion in the neighborhood, especially during school pick-up and drop-off periods;
- Traffic and Parking: concerns about school vehicle circulation on neighborhood streets.
- Traffic and Parking: concerns about traffic from special school events;
- Traffic and Parking: concerns with traffic generated by faculty and staff and deliveries of goods and services;
- Traffic and Parking: concerns with bus routes and queuing during loading and unloading of students;
- Traffic and Parking: concerns about poor street conditions and impacts of school traffic on street conditions;
- Traffic and Parking: concerns that the proposed access road would impact single-family residences and not adequately address access and queuing problems;
- Traffic and Parking: concerns over spillover parking onto adjacent streets during drop offs, pick ups, and special events.
- Traffic and Parking: concerns over inadequate on-site parking and reliance on surface parking lots;
- Aesthetics: concerns over the size and appearance of the proposed alternatives within a predominantly single-family neighborhood;
- Aesthetics: concerns about light and glare and noise impacts on single-family residences;
- Land Use: concerns over the demolition of five single-family structures along Nob Hill Avenue North and Newell Street;
- Land Use: concerns over high-impact institutional activities being located next to single-family residences;
- Land Use: concerns that the expansion is not compatible with the single-family neighborhood and exceeds the capacity of the site;
- Earth: concerns over development on steep slopes and the addition of impervious surfaces;

[1] The written comments are located in the Master Use Permit (MUP) file maintained by DPD.

- Construction Impacts: neighborhood concerns over construction activities, the duration of construction for the proposed project, and the cumulative impacts of the two phases of construction.

- Air Quality: concerns about vehicular emissions associated with drop-off and pick-up activities, surface parking, and the underground parking garage.

- Air quality: concerns about odors from food preparation.

In addition to the SEPA scoping issues, several comments expressed concern that activities and enrollment at the school have expanded without explicit City authorization and that the resultant impacts have not been addressed. In addition, comments were received stating that the school has violated the conditions of permits issued in the past. The possible violation of Land Use Code requirements and permit conditions is being pursued by DPD through an enforcement proceeding and is not evaluated in this Draft EIS.

1.5 Impact and Mitigation Summary

The following table summarizes the identified probable adverse environmental impacts and proposed mitigation measures (Table 1-1) associated with the proposed expansion of the Seattle Country Day School. The reference to "SMC" in this table and elsewhere in this Draft EIS refers to the Seattle Municipal Code adopted by the City of Seattle to regulate land use and development. Refer to Chapter 3 for further discussion of these impacts and mitigation measures.

Table 1–4. Summary of Environmental Impacts and Proposed Mitigation Measures

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Earth Resources	• No significant impacts to earth resources are anticipated at the completion of the project. • Additional stormwater runoff from increased impervious surfaces.	• Similar to Alternative 1.	• No impacts to earth resources are anticipated.	• The project will comply with the Seattle Stormwater Grading and Drainage Control Code (SMC 22.800).
Land Use	• Institutional use would continue and expand in a single-family neighborhood. • Demolition of single-family houses to expand institutional uses. • Demolition of single-family structures reduces buffer between adjacent single-family homes and the school. • Reduction in open space. • Requires variance for lot coverage.	• Demolition of an additional single-family structure further reduces buffer between adjacent single-family homes and the school. • More open space and less impervious area due to demolition of single-family home and addition of landscaped playfield.	• Institutional use in a single-family neighborhood would continue.	• Design features (i.e., façade and green roofs) provide better integration with character of surrounding area and more consistency with comprehensive plan policies for single-family areas. • Specific mitigation measures associated with each proposed alternative are discussed below. **Alternative 1:** • Implementation of features would help to mitigate impacts associated with the integration of the facility with surrounding land uses, which are primarily single-family residential. • New development would be concentrated at the eastern part of the site away from the majority of single-family residences. • Perimeter landscaping would provide shade, scale and screening of the campus and would help define the neighborhood edge. • A variance for lot coverage would be required in Phase II in order to retain

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Land Use (continued)				one residential structure on site. This structure would be converted to school administrative uses. **Alternative 2:** • Similar to Alternative 1, design features, building clustering and landscaping would help to mitigate potential impacts associated with the increase in intensity of land use. No variance for lot coverage would be required with Alternative 2.
Aesthetics	• Vehicle headlights would impact adjacent residential properties during use of the on-site parking lots and new access-drive. • The most significant aesthetic impact would relate to the change in the bulk and scale of the school property when viewed from off-site. On-site residential structures would be removed and changed into parking lots, playfields, school buildings, and an access drive during Phases 1and 2. A new middle school building would be constructed on the southeast portion of the site. The new school buildings would be much larger in scale compared to the existing residential properties. • Adjacent residences would experience increased noise from the new playfields.	• Phase 2 light and glare impacts would be more intense for the residence at the southeast corner of Nob Hill Ave. N. and Newell St. when the home at Nob Hill Ave. is removed. • With removal of the home at Nob Hill Ave., residents immediately north of the school would view the school rather than residential buildings. • The playfield at the north end of the site would be a source of long-term noise impacts to adjacent properties.	• No impacts to aesthetics are anticipated.	• Lighting impacts would be minimized through the incorporation of landscaping and fencing. • Lighting would be directed on-site to avoid impacts to adjacent properties. • Design features intended to minimize the impacts of land use changes and to bulk and scale of the new buildings have been incorporated through proposed façade building materials, landscaping, and the installation of "green roofs." • Noise impacts at new playfields would be reduced by surrounding landscaping. The playfields would not be lighted so there would be no nighttime use.

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Transportation	• Traffic volumes would increase with or without the project as a result of the on-going middle school grade reorganization.* • Drop-off and pick-up operations would be improved with the increased queuing space which could handle 22 more vehicles than the current drop-off/pick-up area. • Bus operations would be improved since buses would be able to load on the new access drive and not block adjacent streets. • On-site parking capacity would increase from 29 spaces to 54 spaces with Phase 1 and to 60 spaces with Phase 2. • Increased on-site parking would reduce the number of school-related cars parked on-street, including during special events.	• Similar to Alternative 1.	• Traffic volumes would increase with or without the project as a result of the on-going middle school grade reorganization.* • There would be no improvements to drop-off/pick-up. • There would be no increased on-site parking. • Buses would continue to block adjacent streets when loading students.	• A coning plan would be developed for the turnaround on Nob Hill Avenue to limit access for pick up and drop off activities to the new private drive with access on 4th Avenue North. • The school would continue to work with neighbors in forums to address operational issues related to student drop-off and pick-up activities, parking, and special events. • An Operations Plan would be prepared and implemented to ensure transportation operations function effectively.

** If the school enrollment increases beyond the additional 23 students as proposed in the middle school reorganization plan, traffic and parking conditions could be impaired.*

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Construction	• Soils would be exposed during the excavation and grading phases of construction, which could result in a potential for soil erosion, particularly along the steep slope areas. • Excavation at the below-grade portion of the new middle school building could encounter underlying glacially overridden silt that may require extra removal effort. • Significant grading would be required for construction of the through-access drive, the north parking area, and the play area adjacent to Nob Hill Avenue North. • The most significant grade differential occurs adjacent to the proposed access-drive, which would require construction of a retaining wall. • Shoring would be required on the south end of the new middle school building due to its proximity to a steep slope. • Dewatering may be required if groundwater is encountered. • Five residential properties and a garage would be demolished, altering the bulk and scale of the site.	• Similar to Alternative 1. • Additional clearing and grading would be required with the demolition of an additional house. • During Phase 2 construction, the home at 2632 Nob Hill Ave. N. would be demolished and modified into a playfield, changing the appearance of the site.	• No construction impacts would occur.	• Construction activities would be conducted in accordance with the City of Seattle's clearing and grading requirements. • Earthwork would be scheduled during summer and fall months, when drier weather would maximize the potential for using on-site soils and minimize erosion potential. • Best management practices (BMPs) would be used during construction to minimize erosion of exposed soil. BMPs would be detailed in a site-specific erosion and sedimentation control plan. • All construction activity would comply with applicable requirements for temporary erosion and sediment control and drainage measures as established by the Seattle Stormwater, Grading and Drainage Control Code (SMC 22.800) and Environmentally Critical Areas (SMC 22.800). • Project would comply with current City stormwater regulations. • Dewatering water would be treated on-site and discharged to the public sewer system. • Contractors would be required to comply with City of Seattle noise standards for construction. • Construction hours would comply with those established in the Seattle Noise Ordinance.

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Construction (continued)	• No significant light and glare impacts are anticipated during construction. • Short-term noise and vibration from construction equipment could impact surrounding residential properties. • Minimal noise impacts would be associated with construction workers' voices. • Construction could generate dust on site. • Paving activities could generate odors. • Construction vehicles would increase traffic on adjacent streets and add heavy equipment to the traffic mix. • Construction traffic would include 325 dump trucks during Phase 1 and 200 trucks for Phase 2. For both phases, most dump truck traffic would occur over a 4 week period. • Phase 2 construction would cause some on-site parking to be temporarily unavailable for one school year. • Construction employees would add to traffic and parking problems near the site unless required to park off-site and shuttled to the site. • Underground utilities could be encountered during clearing			• If construction activities exceed permitted noise levels, the contractor would be instructed to reduce noise impacts. Measures could include additional muffling of equipment or erecting a temporary sound-absorbing fence. • When school is in session, construction worker parking would be provided off-site with a shuttle to the site to mitigate short-term construction impacts to surrounding land uses. • Off-site parking spaces would be secured to replace those that would be temporarily unavailable during construction. • Prior to any remodeling or demolition of existing structures, surveys could be conducted to identify the presence of asbestos, lead-based paint, and to quantify PCB light ballasts and mercury fluorescent light tubes. • A construction management plan (CMP) would be developed to control vehicle and pedestrian activities during construction and to ensure minimal traffic disruptions to emergency service providers. • Contractors would be required to meet Puget Sound Clean Air Agency (PSCAA) requirements and City BMPs to reduce dust and odors.

Element of Environment	Alternative 1 – Preferred Alternative	Alternative 2 – Reduced Lot Coverage	Alternative 3 – No Action	Mitigation Measures
Construction (continued)	and grading resulting in potential disruptions in service. • Public utilities could be temporarily disrupted as utility lines are connected to new facilities. • Emergency service vehicles could be temporarily delayed if construction vehicles occupy roadways, or if traffic is backed up during construction.			• Contractors would consult utility providers to ensure utility lines are unaffected.

CHAPTER 2.0 DESCRIPTION OF ALTERNATIVES

The proposed action is an expansion and redevelopment of the existing facilities at the Seattle Country Day School. Three alternatives are evaluated--two action and one no action alternative. Seattle Country Day School has determined that the existing facility is not adequate to meet the program needs of the school. Figure 2-1a shows the existing school facility. The school has indicated that the proposed expansion is not being undertaken in order for the school to expand its enrollment. As discussed in Section 1.3, the purpose of the expansion is to provide a dedicated middle school building, updated classrooms, a centralized administration area, a renovated gymnasium and lunchroom, and additional playground space. The expansion is also intended to provide a new access and pick-up/drop-off area and increase parking spaces on-site. As explained in Section 1.2, the school anticipates that school enrollment could temporarily increase by 23 students and school staff could increase by 5 staff with or without the project.

2.1 Alternative 1—Preferred Alternative

The proposed project includes construction of two new 2-3 story academic buildings, parking areas, playfields, and a private access driveway and renovation of existing structures (see Figures 2-1 and 2-2). The project would be constructed in two phases, with four to ten years[2] between phases. The proposed project would expand the facilities from approximately 43,000 square feet of classroom and administrative space to 77,000 square feet at the end of Phase 2. In addition, a 10,000 square foot, single story parking garage would be constructed in Phase 2 beneath the new building. Building elevation drawings are available in the Master Use Permit file maintained by DPD.

Phase 1 construction would include a new 2-3 story middle school building, a new access driveway from 4th Avenue North to provide automobile pick-up and drop-off and access to parking, and renovation of existing facilities (See Figure 2-1b). The new middle school building would be approximately 33 feet high and would occupy 20,726 square feet in an area currently occupied by a paved parking lot. The building's façade would extend approximately 115 feet along 4th Avenue North. The new Phase 1 building would house 11 classrooms, including rooms for general use, science, art, and technology; a multi-purpose room; and a storage area. Renovation of existing facilities would include converting the two classrooms in the gymnasium building to a fitness room and renovating rooms in the existing middle school building to provide seven classrooms for grades 4 through 5 and administrative offices. As part of Phase 1, five single-family houses owned by Seattle Country Day School (houses 1, 2, 4, 5, and 6 on Figure 2-1a), a separate garage for house 6, and the dilapidated greenhouse would be demolished. House 3 would be retained, but changed in use from single-family to institutional use.

A new access drive from 4th Avenue North would be constructed and a new pick-up/drop-off area would be provided on this access drive (see Figure 2-1b). The drive would extend to a new

[2] The Variance application submitted by Seattle Country Day School states that there would be five to ten years between construction of Phase 2. The Variance application will be amended to state four to ten years.

turnaround at the end of Nob Hill Avenue North. Passenger vehicles would access the pick-up/drop-off area through the new driveway from 4th Avenue North. Vehicles would travel west and circle the new turnaround at the end of Nob Hill Avenue and turn east to the pick-up/drop-off area in front of the school building. The pick-up/drop-off area would have queuing space for approximately 29 vehicles an addition of 22 spaces. Buses would access the pick-up drop-off area from Nob Hill Avenue North, turning left onto the new access drive and loading and unloading students in front of the existing middle school building before exiting the drive and turning left on 4th Avenue North and left onto Newell Street to leave the area. The existing 29 on-site parking spaces would be increased to 54, with parking provided in a new lot east of the Nob Hill Avenue North turnaround, along the access drive, and in a new lot at the corner of 4th Avenue North and Newell Street.

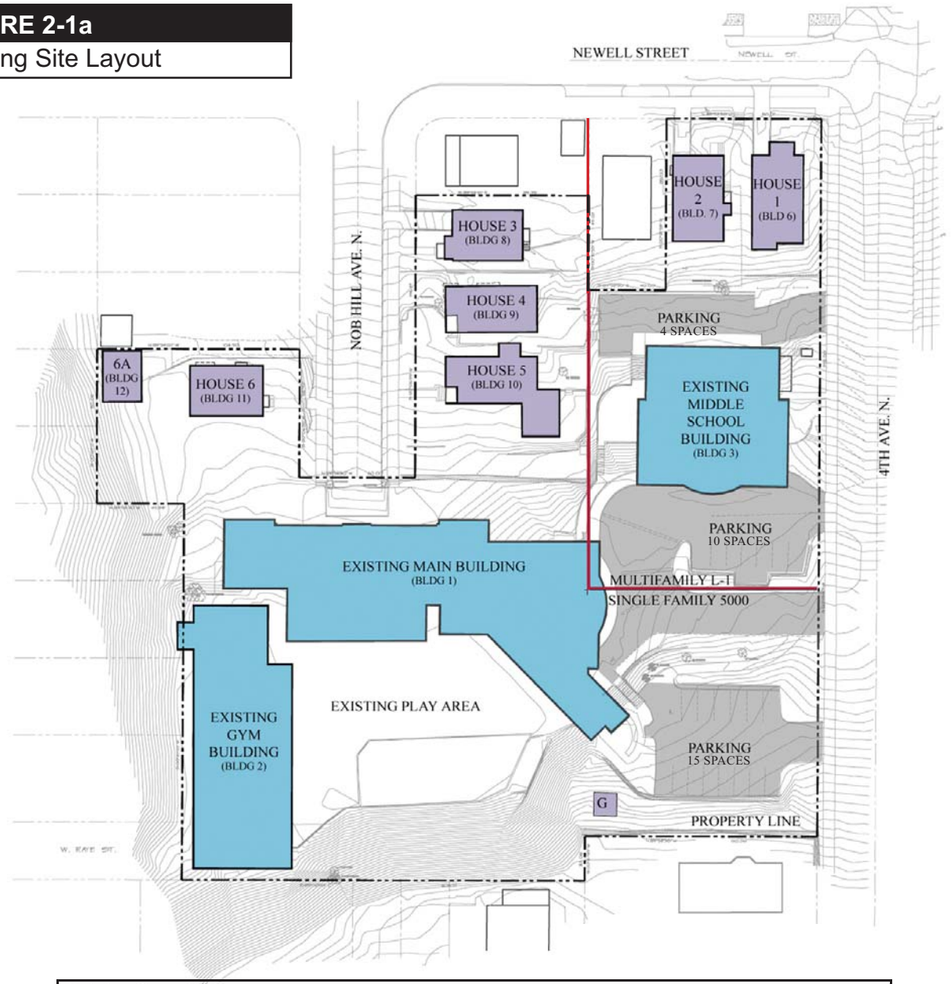
The project would include street improvements to 4th Avenue North. A new sidewalk and curb and gutter would be installed on 4th Avenue North for the length of the school site per Seattle Department of Transportation (SDOT) requirements. New stormwater detention facilities would be installed as required by SDOT.

A new playfield would be located south of the access drive and east of the Nob Hill Avenue North turnaround. No lighting is proposed for the playground.

The new middle school building would be designed using a variety of forms and materials to both reduce the scale of the buildings and integrate the buildings into the existing campus and surrounding neighborhood. The new middle school building that would be constructed during Phase 1 would be built on a brick base, which is similar to materials on the existing primary building. The upper portion of the building would use flat roof blocks broken up with triangular roof forms (gables) to blend with the residences in the surrounding area. Vegetation would be incorporated into the design of the middle school building roof. Flat garden roofs, which would include walking terraces and shingled gabled portions, would be included in the roof design. The roofs would improve the view of the school from above. Landscape design along 4th Avenue North, the major public façade of the school, would include strategically planted large shade trees, small shrubs, perennials, and other groundcovers to visually mitigate the scale of the new buildings, parking lots, and playfields. During Phase 1 construction, the administrative offices would be temporarily moved to the existing middle school building.

In Phase 2, the existing 12,956 square foot middle school building (constructed in 1982 and expanded in 1994) would be demolished and a new 2-3 story building would be constructed to house 13 classrooms for grades 4 and 5 (See Figure 2-2a). A new administrative area would be constructed and the administrative facilities would be relocated from the temporary facilities used during Phase 1. The new classroom and administrative building would be 28 feet high and occupy 26,253 square feet. Comparatively, the current middle school building is also 28 feet high, but occupies only 12,956 square feet. Common hallways would be provided to connect to the existing main building with the new classroom and administration building. In addition, a 29-car parking garage and utility areas would be constructed under the building, increasing on-site parking to 60 spaces. The parking lot constructed west of the Nob Hill

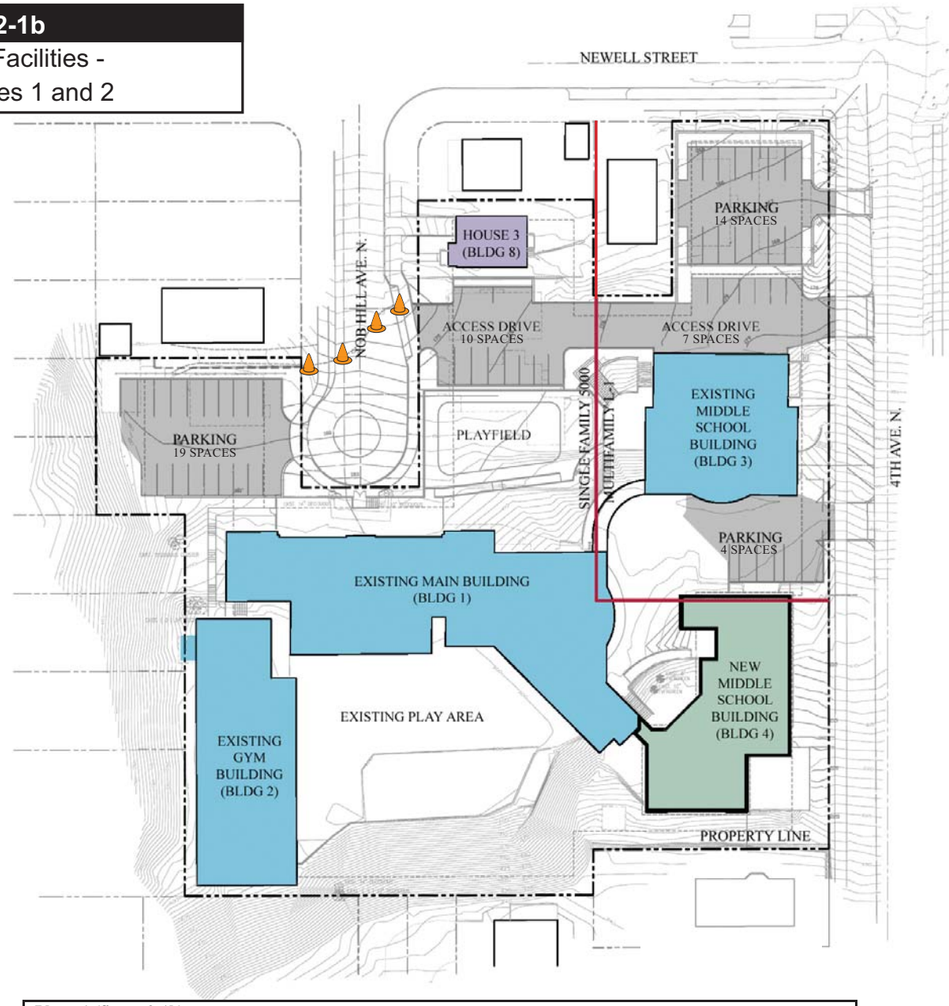
FIGURE 2-1a
Existing Site Layout



Existing (figure 2-1a)			
BUILDING	**USES**	**SIZE** (square feet)	**NUMBER OF CLASSROOMS**
Building 1 (Main)	K-3 Classrooms, Administration, Lunchroom, Library	22,274	12
Building 2 (Gymnasium)*	Gym, Grade 2 Classrooms	7,802	2
Building 3 (Existing Middle School)	Grade 4-8 Classrooms	12,956	13
Building 6 (House 1)	Administration	1,600	0
TOTAL		44,632	27
On-site Parking	29 Spaces		

* The Gymnasium building currently includes 2 classrooms plus the gym. In phase 1 the classrooms are converted to a single fitness room (not tabulated as a classroom) and the gym remains.

FIGURE 2-1b
Phase 1 Facilities -
Alternatives 1 and 2



Phase 1 (figure 2-1b)			
BUILDING	**USES**	**SIZE** (square feet)	**NUMBER OF CLASSROOMS**
Building 1 (Main)	K-3 Classrooms, Lunchroom, Library	22,274	12
Building 2 (Gymnasium)*	Gym and Fitness	7,346	0
Building 3 (Existing Middle School)	Grade 4-5 Classrooms, Adminstration	12,956	7
Building 4 (New Middle School)	Grade 6-8 Classrooms, MP room	20,726	11
Building 8 (House 3)	Administration	1,600	0
TOTAL		64,902	30
On-site Parking	54 Spaces		

* The Gymnasium building currently includes 2 classrooms plus the gym. In phase 1 the classrooms are converted to a single fitness room (not tabulated as a classroom) and the gym remains.

Temporary traffic cones

ADOLFSON

NORTH
No Scale

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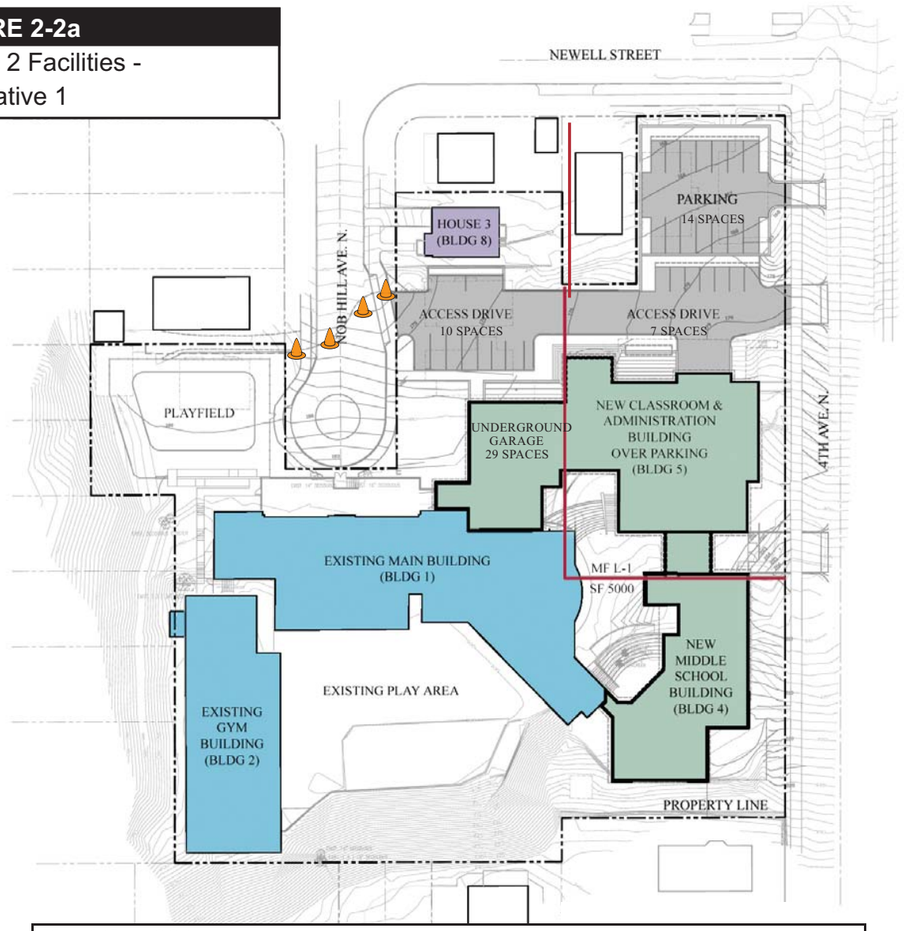
Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 2-1.
EXISTING CONDITIONS AND PROPOSED PHASE 1 FACILITIES
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

FIGURE 2-2a
Phase 2 Facilities -
Alternative 1



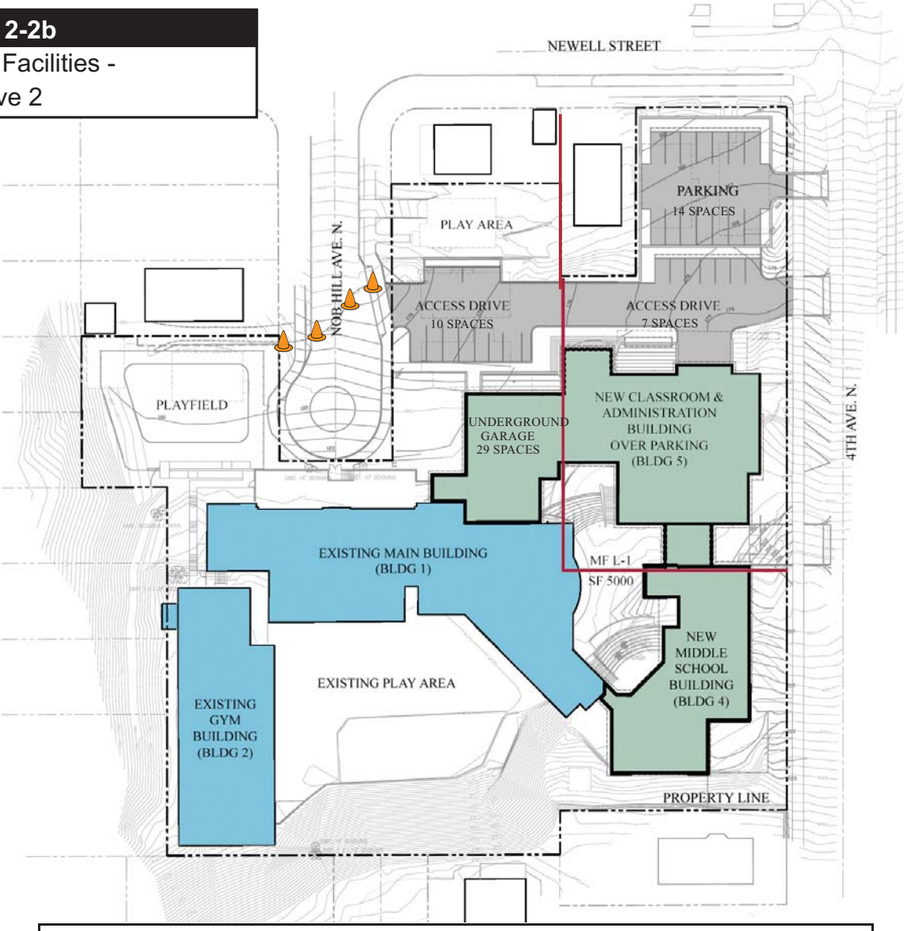
Phase 2 (figure 2-2a)			
BUILDING	**USES**	**SIZE** (square feet)	**NUMBER OF CLASSROOMS**
Building 1 (Main)	K-3 Classrooms, Lunchroom, Library	22,274	10
Building 2 (Gymnasium)*	Gym and Fitness	7,346	0
Building 4 (New Middle School)	Grade 6-8 Classrooms, MP room	20,726	11
Building 5 (New Classroom/Admin Bldg)**	Grade 4-5 Classrooms, Administration	26,253	13
House 3 (Building 8)	Administration	1,650	0
TOTAL		78,249	34
On-site Parking	60 Spaces		

* The Gymnasium building currently includes 2 classrooms plus the gym. In phase 1 the classrooms are converted to a single fitness room (not tabulated as a classroom) and the gym remains.

** The Building 5 total does not include 9,648 SF below-grade parking garage.

Temporary traffic cones

FIGURE 2-2b
Phase 2 Facilities -
Alternative 2



Phase 2 (figure 2-2b)			
BUILDING	**USES**	**SIZE** (square feet)	**NUMBER OF CLASSROOMS**
Building 1 (Main)	K-3 Classrooms, Lunchroom, Library	22,274	10
Building 2 (Gymnasium)*	Gym and Fitness	7,346	0
Building 4 (New Middle School)	Grade 6-8 Classrooms, MP room	20,726	11
Building 5 (New Classroom/Admin Bldg)**	Grade 4-5 Classrooms, Administration	26,253	13
TOTAL		76,599	34
On-site Parking	60 Spaces		

* The Gymnasium building currently includes 2 classrooms plus the gym. In phase 1 the classrooms are converted to a single fitness room (not tabulated as a classroom) and the gym remains.

** The Building 5 total does not include 9,648 SF below-grade parking garage.

Temporary traffic cones

ADOLFSON

NORTH
No Scale

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Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 2-2.
PROPOSED PHASE 2 FACILITIES - ALTERNATIVES 1 AND 2
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

Avenue North turnaround for Phase 1 would be removed because additional parking will be provided under the new classroom building. The area would be converted to a playfield to replace the playfield located south of the access drive in Phase 1. No lighting is proposed for the playground.

The new classroom and administration building that would be constructed during Phase 2 would incorporate the same exterior design described for the Phase 1 building (see page 2-2), including the addition of a green roof. Perimeter landscaping installed during Phase 1 would also lessen the bulk and scale of the new building.

This alternative would require approval of a variance for lot coverage due to retention of one single-family house (house 3 on Figure 1-1a). Retention of house 3 in this alternative would provide a partial buffer between the single-family house to the north and the new access drive. The variance application is included in Appendix B of this document. A variance is required because the lot coverage limits in the SF-5000 zone portion of the school property would be exceeded by 1.4 percent. The lot coverage limit is 35 percent and the proposal for Alternative 1 would have a lot coverage of 36.4 percent. The L-1 zone portion of the property will be developed to 34 percent. The maximum lot coverage in the L-1 zone is 40 percent.

2.2 Alternative 2—Reduced Lot Coverage

Alternative 2 is the same as Alternative 1 for Phase 1, but in Phase 2 an additional single-family house at 2632 Nob Hill Avenue North (house 3 on Figure 1-1a) would be demolished. The site of the single-family house to be demolished would be landscaped and used as a playfield (see Figure 2-2b). Demolishing the building would reduce the lot coverage of the project to below the 35 percent limit for single-family zones. This alternative would not require a variance for lot coverage.

2.3 Alternative 3—No Action

Alternative 3 would maintain the existing conditions at Seattle Country Day School with the existing school facilities. Under this alternative, no changes would occur at the site except for routine maintenance. As described in Section 1.2, enrollment could temporarily increase by up to 23 students and up to 5 staff as the school attempts to stabilize its middle school enrollment.

2.4 Other Alternatives Considered

This section describes various alternatives that were considered by the school, but were not carried forward for further analysis in the Draft EIS.

2.4.1 Design Alternatives

Seattle Country Day School worked with Carlson Architects to plan the new school facilities. During that process, three site development alternatives were considered, labeled Options A, B, and C. Option C was selected as the preferred design, was further developed in the design process, and is presented as Alternative 1 in this EIS. Options A and B are shown in Figure 2-3a

and b. These figures show only the final project at the end of Phase 2. The interim Phase 1 construction is not shown.

Option A (see Figure 2-3a) would include two new buildings that extend north from the existing school buildings. An access drive would connect 4th Avenue North with Nob Hill Avenue North under the new buildings. The southern end of Nob Hill Avenue North would be developed as a turnaround to support queuing on the access drive. New playfields would be constructed on Nob Hill Avenue west of the turnaround and between the parking areas adjacent to 4th Avenue North. A parking structure would be located under the western new building. Option A would provide 29 on-site parking spaces.

Option A was rejected because the new buildings would be constructed close to existing single-family housing, creating height, bulk, scale, and shadow impacts to adjacent properties. The dispersed building layout would not allow the school to consolidate functions as desired, and Option A would provide less on-site parking capacity than Option C (29 spaces for Option A versus 60 spaces for Option C).

In Option B (see Figure 2-3b), a new building would be constructed along the north side of the existing main building and extend into the Nob Hill Avenue North right of way. A second, smaller building would be built on the north side of the existing middle school building. The larger building would be constructed mostly on school property, but would require a street vacation at the southern end of Nob Hill Avenue North. An access drive would be built from 4th Avenue North to Nob Hill Avenue North. It would extend under the new building north of the middle school and access the below-grade parking at the larger building. Three new playfields would be constructed—one west of the new large building, one north of the access drive near Nob Hill Avenue North, and one between parking areas adjacent to 4th Avenue North. Option B would provide 35 parking spaces.

Option B was rejected because of potential height, bulk, scale, and shadow impacts on adjacent residential properties and the need to vacate Nob Hill Avenue North. Option B would not provide the dedicated middle school building that is one of the most important criteria of the school expansion. Option B would also provide less on-site parking capacity than Option C (35 spaces for Option B versus 60 spaces for Option C).

Option C (see Figure 2 –2) was selected as the preferred design because it concentrates the new building development on the upper portion of the site where the bulk and scale impacts to the surrounding neighborhood would be less. Option C provides a better function for the school because the facilities are more consolidated and there is an identifiable, separate middle school. Option C also provides the maximum amount of on-site parking.

FIGURE 2-3a
Option A

FIGURE 2-3b
Option B

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Original graphic by: JAB
Edits by:
Date: 01/22.04

Source:
Carlson Architects

FIGURE 2-3.
OTHER ALTERNATIVES CONSIDERED
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

2.4.2 Other Alternatives

Several other alternatives to the proposal have been suggested by neighborhood residents. These are described briefly along with the reasons they were not carried forward for analysis in the Draft EIS.

Table 2-1. Other Suggested Alternatives

Suggested Alternative	Reasons Not Carried Forward
The school has outgrown its existing location and should relocate to another site.	The school discussed this option, but determined that a move was not practical or affordable for the school.
Lot coverage on the site could be reduced by constructing smaller buildings.	The school believes that the proposed building sizes are necessary to meet educational goals and to remain competitive with other independent schools. The new middle school building would allow the school to account for improved retention of students from lower grades into middle school. The increased space would allow the school to increase elective course offerings and instruct students in small class groupings for some subjects, an attractive feature of an independent school
Retain all single-family structures to maintain neighborhood character.	The school considered retaining the school-owned single-family structures and using them to house classrooms or administrative space. However, using the houses as classrooms would not allow adjacency of classrooms and would cause security issues when students transfer between houses and buildings. The school also has a goal of making the campus more accessible and this would be difficult if existing buildings were used for classrooms. If the houses were used as administrative space and the existing administrative space in the classroom buildings were used as classrooms, there would not be enough classroom space to meet the school's education goals. In addition, there would be no additional area to add additional on-site parking. This alternative was not carried forward by the school because it does not meet the school's objectives.
4th Avenue North should be widened and used for queuing and drop-offs.	There is not adequate space along 4th Avenue North to provide a significant amount of queue space and the steepness of the street would make pick-up and drop-off difficult and dangerous.
The school should utilize satellite pick-up/drop-off areas and shuttle students to the school.	The school has studied the viability of busing students to school. It was determined that busing was not feasible at this time because there are not enough students living in one area to form a critical mass for busing. The busing option is still under consideration by the school. The school has also evaluated using a satellite pick-up/drop area. This option is not considered viable because there is no location near the school that has adequate parking with a covered and lighted waiting area that could be used. No other elementary or middle school in the region operates with a remote student pick-up/drop-off area, in part because of potential liability issues.

2.5 Benefits and Disadvantages of Current Proposal

The Seattle SEPA Code (SMC 25.05.440 D.3. g) requires discussion of the benefits and disadvantages of reserving for some future time the implementation of the proposal. Seattle Country Day School has determined that the existing facilities are not adequate to meet its educational goals. The curriculum the school would like to offer is constrained by space limitations and outdated facilities. For example, classrooms being used for middle school students are sized for smaller children; the location of administration offices does not fulfill primary functions, including providing security or facilitating parent access; and limited vehicle access as well as parking limitations create concerns over traffic and congestion. Specific examples of curriculum deficiencies include: the middle school science lab does not have teacher preparation space or adequate storage space; administrative offices lack adequate conference spaces for parent/teacher meetings; and middle school students do not have a common space for assemblies, presentations, seminars, and guest speakers. Common spaces are currently limited to the Viewing Room, the gymnasium, and the lunchroom, which are scheduled throughout the day for other uses.

The school proposes to upgrade existing facilities in the near-term to remain a competitive independent private school providing students and faculty with state of the art facilities. Operating the school under current conditions and reserving development for the future would not be a feasible alternative for Seattle Country Day School. Further, the proposed design of the middle school building would allow flexibility to schedule classes and electives with the addition of classrooms. Teachers would not be required to share classroom spaces, allowing a larger preparation space for their programs and meeting facilities for parents and students during class transition periods. The technology and music programs would benefit with the addition of a computer lab and a room dedicated to the music program for the younger grades. In addition, the benefits to the neighborhood related to improved queuing, pick-up/drop-off space, and circulation would be delayed if development were reserved for some future time.

Potential benefits related to reserving implementation of the proposal for some future time include maintaining five to six existing residential structures. These houses, owned by Seattle Country Day School, are proposed for conversion to school use.

CHAPTER 3.0 ELEMENTS OF THE ENVIRONMENT

3.1 Earth

This section discusses the existing conditions related to earth resources at the school site. Operational impacts and mitigation measures are also discussed. Construction impacts and mitigation measures related to earth resources are described in Section 3.5.

3.1.1 Affected Environment

The description of the existing geology and soils at the project site is based on AMEC Earth & Environmental, Inc. (AMEC) *Geotechnical Engineering Report Seattle Country Day School Classroom Building Additions* submitted to Seattle Country Day School (August, 2003). This report is included as Appendix A.

The project area is characterized as a moderate to steep north-facing slope that has been modified by development activities. Slope inclinations adjacent to the project site average approximately 20 percent along the paved roadways. The project site includes moderate and steep slopes that generally slope down from south to north, separated by flat-lying terraces, with a total topographic relief across the site of approximately 70 feet and a 19 percent change in elevation (AMEC, 2004)[3]. The majority of the site has been disturbed by construction of school facilities and single-family residential houses (AMEC, 2004).

3.1.1.1 Sensitive Areas

Chapter 25.09 of the Seattle Municipal Code defines environmentally critical areas (ECAs) and establishes development standards for land containing ECAs. Environmentally Critical Areas include wetlands, steep slopes, landslide-prone areas, liquefaction-prone areas, flood-prone areas, riparian corridors, fish and wildlife habitat conservation areas, and abandoned landfills. Other than steep slopes and a landslide prone area, no other critical areas, habitat or species have been found on the site. Based on specific criteria for steep slopes, some of these areas, in particular the south slope where construction would occur, would be regulated and adhere to ECA standards.

The City of Seattle's *Environmentally Critical Areas Folios* (City of Seattle DCLU, 1996) were reviewed for this project. The steepest slope on the site is located on the south side with an inclination of about 88 percent. Documented steep slopes (slopes of 40 percent or greater) exist at the southern end of the project site near the gymnasium and along the western border of the school property (Figure 2-1a). These areas are undeveloped and vegetated with both maple and fir trees and contain a moderate to heavy understory of blackberry vines and ferns. The southernmost slope has an approximate inclination of 1.5H:1V (Horizontal:Vertical) (66.7

[3] A copy of the site topographic map is located in the Master Use Permit file maintained by DPD.

percent slope) with approximately 30 feet of vertical relief. The slope along the western portion of the site slopes downward to the west and is inclined at approximately 1.5 to 1.75H:1V (66.7 to 30 percent slope). Other man-made moderate slopes are located throughout campus and include rockeries, cast-in-place concrete walls, buildings, and gravity walls (AMEC, 2004).

In addition to on-site steep slopes, a large portion of the northern end of the school property, currently occupied by single-family homes, is designated as a potential slide area (City of Seattle DCLU, 1996). The project site does not fall within a liquefaction zone according to the Seattle's *Environmentally Critical Areas Folios* (City of Seattle DCLU, 1996).

AMEC performed both a historical review and a field reconnaissance of the site to determine the stability of the steep slopes. The on-site investigations performed in May and June 2003 did not disclose the physical presence of any recent slope movement, which is typically indicated by leaning trees or bowed tree trunks, vertical or near-vertical cliffs, and tension cracks. AMEC noted that dense vegetation and steep slope inclinations may have concealed some evidence of past slope movement (AMEC, 2004). The historical review consisted of research of City of Seattle Department of Planning and Development files for historical landslide activity within a 500-foot radius of the project site. Historical records revealed three landslides had occurred within the area since 1933, with the most recent and nearest to the site occurring in November 1978 as a result of a clogged catch basin on Queen Anne Drive. Surface water was subsequently diverted down the steep slope north of Nob Hill Avenue North, which eroded a block of soil approximately 5 to 20 cubic yards in volume that was deposited at the base of the slope, immediately behind the primary school building. The catch basin was replaced and other drainage improvements were made (AMEC, 2004). No failures have occurred on the site since the improvements were complete.

The steep slopes on the south and west sides of the site do not appear to be at a significant risk of a deep-seated failure; however, there is a moderate risk of near-surface slope failures due to the steep slope inclinations and the presence of loose surficial soils typically found on slopes.

The Seattle Municipal Code establishes development limitations and buffers for areas having over 40 percent slope. Generally, development should be avoided on areas over 40 percent slope. Additionally, the City of Seattle requires a 15 foot buffer from the toe of a steep slope to development whenever practicable based on geotechnical and hydrological site constraints and the impacts of construction methods on slope stability, erosion potential, and topography and vegetation disruption (SMC 25.09.180 A.2).

3.1.1.2 Soils

The *Geotechnical Engineering Report* prepared by AMEC (2003) summarizes results of test borings that are used to determine near-surface soil conditions and mapped stratigraphy. Soils at the school site are characterized as glacially derived soils deposited during the Vashon Glaciation between 13,000 to 17,000 years ago. Soils underlying the site generally consist of thin discontinuous wedges of uncontrolled fill soil that covers silty fine to medium sand varying to a fine to medium sand with a presence of silt.

Soils encountered during test borings included fill soil, composed of very loose to loose, moist, fine to medium sand with trace gravel and scattered asphalt chunks; organic rich silt; an advanced glacial outwash deposit composed of medium dense to very dense, damp to saturated, gravelly sand known as the Esperance Sand; an advanced glaciolacustrine deposit known as Lawton Clay that is characterized by medium dense/stiff to very dense/hard, moist to saturated, interbedded fine sand and silt that is thinly to thickly laminated; and weathered glacial till characterized as a medium dense to very dense, damp to wet, silty gravelly sand. These onsite soils are generally described as moisture-sensitive and easily disturbed when wet. Therefore appropriate temporary drainage systems should be installed and earthwork should be scheduled for the summer and fall months when drier weather will maximize the potential for reusing onsite soils (AMEC, 2004).

3.1.1.3 Groundwater

Groundwater was encountered in eight of the ten soil borings performed by AMEC, resulting from the presence of two generally distinct groundwater zones within the project site. Groundwater measurements taken in May and June 2003, indicated the groundwater depth at the proposed middle school building was between 23 and 26 feet, with the remainder of the site having groundwater levels that varied between 3 and 30 feet. Groundwater levels are expected to rise during the winter and spring with increased precipitation (AMEC, 2004).

3.1.1.4 Drainage

Surface water runoff from the site is currently collected in a series of downspouts, catch basins, and area drains that are eventually conveyed into the City of Seattle's combined public sewer lines in both 4th Avenue North and Nob Hill Avenue North. Two stormwater detention systems serve the site. One serves the east expansion of the primary building and parking lot on the southern portion of the site; the other serves the middle school addition that was constructed in 1994.

Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800-22.808) and associated Director's Rules establish requirements for temporary erosion and sediment control during construction, as well as source control, flow control, and stormwater treatment for development projects. Projects resulting in 5,000 square feet or more of impervious surface, or one acre or more of land disturbing activity, require development of a comprehensive drainage control plan to demonstrate compliance with code requirements (SMC 22.802.020). Chapter 22.802.015 of the Seattle Municipal Code provides a list of construction-related erosion control measures. Such measures include, but are not limited to, stabilization of all soils through installation of seeding, mulching, and covering; prevention of sediment transport from the site through use of stormdrain inlet protection, silt fences, and sediment traps; and dates when no soils are to remain unstabilized for more than two days (from October 1st to April 30th) and seven days (May 1st to September 30th).

3.1.2 Operation Impacts

3.1.2.1 Alternative 1 – Preferred Alternative

No significant operational impacts to earth resources are expected from the Seattle Country Day School Project. The new middle school building proposed at the southeast corner of the project site is expected to neither improve or adversely affect adjacent steep slopes. The new building's south wall would act as a retaining wall, supporting the toe of the slope behind the building, thereby improving the overall stability of the slope (i.e., improving the factor of safety against a deep seated rotational failure). The building would not improve the stability of small, surface failure; however, the steep slope is presently landscaped and no evidence of slope instability has been documented.

At the completion of construction, the stormwater detention system that currently serves the primary school building would remain in operation, with some minor outfall pipe relocation that will bypass the proposed conveyance network by connecting directly to the City's public combined sewer/stormwater system at 4th Avenue North. It is anticipated that the existing detention system for the middle school addition would also be retained.

A new stormwater detention system would be in operation at the north parking areas that would collect stormwater from new roof drains, foundation drains, surface drains, and runoff through a new pipe system. This detention system would discharge to the City of Seattle public combined sewer/stormwater system in 4th Avenue North near the Newell Street intersection. Preliminary detention volumes have been calculated using the City of Seattle Storm Water Tank Design guidance. Assuming the existing detention tanks would remain operational and the proposed playfield is semi-pervious, calculations indicate the need for a detention tank measuring approximately 125 feet in length and 8 feet in diameter.

Stormwater treatment is not required since the site discharges to a combined sewer/stormwater system. Stormwater would be treated at the wastewater treatment plant.

3.1.2.2 Alternative 2 – Reduced Lot Coverage

Operational impacts would be similar to those described for Alternative 1 above.

3.1.2.3 Alternative 3 – No Action

No operational impacts would occur with the selection of the No Action Alternative.

3.1.3 Cumulative Impacts

No cumulative earth-related impacts are anticipated.

3.1.4 Operation Mitigation

No operational impacts to earth are anticipated, therefore no mitigation is required. Retaining walls required along the steep slopes for stabilization of the parking and vehicular and pedestrian access areas would be a "Pisa" stone type or retaining system, selected for cost-effectiveness and the more residential-quality appearance.

3.1.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts related to earth resources were identified.

3.2 Land Use

This section discusses historic and existing land use and activity levels and provides information on land use and zoning designations, the Seattle Comprehensive Plan, and land use standards in the Seattle Land Use Code. Land use impacts and mitigation measures are also discussed.

3.2.1 Affected Environment

3.2.1.1 Land Use History

The Seattle Country Day School site is located in the northeastern part of the Queen Anne neighborhood in Seattle. A school has existed on the site since 1928. Seattle Country Day School relocated to the site in 1975. Over the past 20 years, there have been several land use and permit decisions relating to the school's development and expansion. The primary issues and conditions of past decisions have focused around enrollment, traffic and parking, use of Nob Hill Avenue and neighborhood communications. Additional conditions related to setbacks and landscaping were also part of these decisions. A chronological summary of the major permits is provided below:

- In 1982, Seattle Country Day School submitted a Master Use Permit application to demolish two existing classrooms and caretakers' quarters and construct a new two-story, 7,652 square foot addition and new on-site parking area for 17 cars. Proposed uses included a library, three classrooms, an audio-visual classroom and apartment for the caretaker.
- In 1989, the school submitted a Master Use Permit application for the conversion of a single-family residence to temporary use as three additional classrooms and storage space, until an addition to the middle school could be constructed and put into use two years later.
- In 1990, the school submitted a Master Use Permit application to construct a two to three story addition of approximately 6,986 square feet to the Science Building.
- In 1998, the school submitted a Master Use Permit application for conversion of a single-family residence to classroom and administrative office space.

3.2.1.2 Existing Land Use and Activity Levels

The Seattle Country Day School site is 101,057 square feet in size and includes 10 buildings and some lawn and landscaping. The site is currently used as a kindergarten through eighth grade independent school. Current levels of institutional activity within the SF zone are characterized as follows: traffic queuing and circulation, truck deliveries, parking, bus loading and unloading, and evening events. See Chapter Section 1.2, Existing Conditions at Seattle Country Day School, for more information about the project site.

Facilities on the site comprise approximately 43,000 square feet and include the following structures:

- A two-story classroom, administration, and lunch room building (constructed in 1928) with a 1982-vintage two-story classroom and library addition;
- A gymnasium building (constructed in 1953) that also contains a two-story classroom annex;
- A 3-story classroom building that was constructed in 1980 with a 1984 addition;
- Two one and two story houses owned by the school are used for institutional use. One is used for school office space and one is used for school storage. The school owns four other houses on the block that are residential rentals.; and
- A small greenhouse.

Land uses in the surrounding area are predominantly single-family residential. A low-rise multifamily residential development exists to the east, and commercial uses are located along Nickerson Street and in the Fremont neighborhood about three blocks north of the site.

3.2.1.3 Relationship to Plans, Policies, and Regulations

Comprehensive Plan Policies

Section C of the Land Use Element of the Comprehensive Plan is discussed below to address the consistency of the proposal with applicable land use goals and policies, as this is a consideration under the SEPA Land Use Policy in SMC 25.05.675 J. In addition, some background information is first provided on the Urban Village strategy adopted as part of the Comprehensive Plan.

The City of Seattle has established comprehensive land use goals and policies in the Comprehensive Plan: Toward a Sustainable Seattle, originally adopted in 1994 and last amended in 2002 (City of Seattle, 2002). The Plan adopts an Urban Village Strategy for the City's preferred development pattern. The Plan includes the following language:

> *The intent is to accommodate growth by building on successful aspects of the city's existing urban character, continuing the development of concentrated, pedestrian friendly mixed-use urban villages of varied intensities at appropriate locations throughout the city* (City of Seattle, 2002).

The plan also establishes goals and policies for areas outside of Urban Villages. These areas are less densely developed, and consist primarily of single-family residential development.

The project site is not located within a designated Urban Village boundary. For areas outside of Urban Villages, the Comprehensive Plan establishes the following goal:

> ***LG27****: Allow limited amounts of development in areas of the city outside centers and urban villages to maintain the general intensity of development that already characterizes these areas and to promote the targeted level of growth in village and center locations* (City of Seattle, 2002).

The project is located in an area generally designated as Single-Family and Multi-Family Residential in the Comprehensive Plan. Single-family areas that are zoned SF 5000 are considered high-density single-family areas in the Comprehensive Plan. A portion of the site is zoned Multi-Family and a Multi-Family Residential Area is located to the east. The following is a discussion of the applicable portion of Section C of the Land Use element of the Comprehensive Plan. The plan establishes the following goals and policies for high-density Single-Family Residential Areas:

> ***LG57:*** *Use the Single-family 5000 zone to protect areas which are predominantly in single-family residential use from incompatible uses.*
>
> ***L73:*** *Affirm and encourage residential use by one household as the principal use in single-family residential areas and the primary use permitted outright.*
>
> ***L74:*** *Limit the number and types of non-residential uses permitted in single- family residential areas to protect those areas from the negative impacts of incompatible uses.*

Comprehensive Plan Policy L77 focuses on Institutions and Facilities in Single Family Residential Areas:

> ***L77:*** *Control the location, scale, access and development standards of institutions and facilities in single-family areas in order to reduce negative impacts such as noise, traffic and parking problems in order to protect Seattle's single-family housing stock through a conditional use or master planning process that considers:*
>
> - *Concentration of institutions of facilities*
> - *Bulk and siting*
> - *Traffic and parking*
> - *Demolition of residential structures*
> - *Height and scale*

Comprehensive Plan policies L80 through L86 further address bulk and siting, height limitations, non-conforming structures, and parking in single-family zones to promote consistency and compatibility of development in single-family areas (City of Seattle, 2004). These policies are implemented by development standards for single-family zones established in the Seattle Land Use Code (see below).

With respect to Multi-Family Residential Areas, Land Use Goals LG43 and LG44 are aimed at encouraging a diversity of multi-family housing types while supporting a residential development pattern that is consistent with the Urban Village strategy. These goals are supported by Policy L58 below:

> *L58: Designate as multifamily residential areas on the attached Future Land Use Map existing areas predominantly occupied by multifamily development, as well as areas where greater residential development is desired to increase housing opportunities and promote development intensities consistent with the urban village strategy.*

Neighborhood Planning

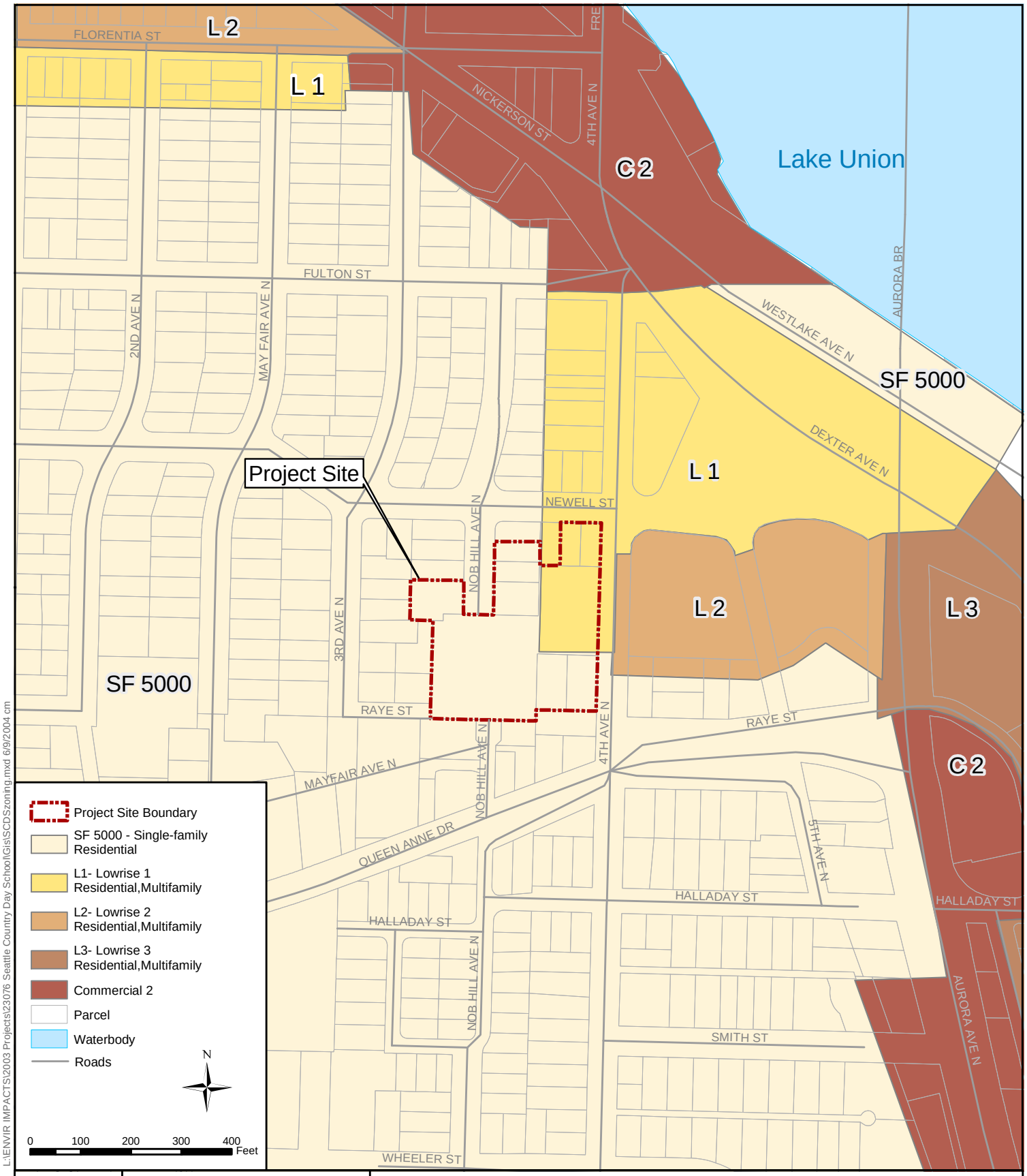
Another component of comprehensive planning in the City of Seattle is neighborhood planning. The Seattle Department of Neighborhoods maintains a collection of 180 recent and historic neighborhood plans and background documents on neighborhood planning in Seattle.

A neighborhood plan was developed for the Queen Anne community and adopted in 1998. The project site is located in the planning area for the Queen Anne Neighborhood Plan. Although the plan is focused around the Uptown Queen Anne Urban Center (Seattle Center Urban Center), it includes goals and policies directing future land use in areas outside the Urban Center. Specifically, Goal 3 and supporting policies LU3.1 through LU3.10 and Goal 4 and policies LU4.1 through 4.3 focus on retaining the community's character, particularly in those areas that are predominantly developed with single-family residences. Policies encourage balanced development, harmonious transition between different land use, and varied housing opportunities but also discourage increases in designated residential densities and in the allowable intensity of commercial uses beyond those specified in Seattle's Land Use Code.

3.2.1.4 Land Use Designations and Zoning Overview

According to the *Seattle Comprehensive Plan Future Land Use Map*, the Seattle Country Day School property is designated as Single-Family and partially Multi-Family Residential (City of Seattle, 2002). Comprehensive Plan land use designations surrounding the property include Single-Family Residential to the south and west, and Multi-Family Residential to the north and east.

The project site is zoned SF 5000 (Single-Family Residential, with a minimum lot size of 5,000 square feet), and L-1 (Residential Multi-Family Lowrise 1). The expansion and redevelopment proposal is located within both zones. The lot area within the SF 5000 zone is 79,715 square feet and the remaining 21,344 square feet are within the L-1 zone. Zoning at the site is shown on Figure 3-1.



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ADOLFSON

Map data are the property of the sources listed below. Inaccuracies may exist, and Adolfson Associates, Inc. implies no warranties or guarantees regarding any aspect of data dipiction.

SOURCE: King County GIS, 2003; Department of Planing and Development, 2001

FIGURE 3-1.

ZONING

SEATTLE COUNTRY DAY SCHOOL EXPANSION

SEATTLE, WASHINGTON

Previous development of the site included the original 1928 school building for the Seattle Junior Academy, which resulted in the creation of an "Institution Use" within this single-family zone. Institution uses are not uses permitted outright in single-family zones by Seattle's Land Use Code. Institution uses in single-family zones are conditionally permitted, and new or expanding institutions must receive approval of an administrative conditional use for the portion of the development in the single-family zone. If an institutional development does not meet development standards (such as lot coverage), then the development proposal also requires approval of a variance.

With respect to multi-family zones (such as the L-1 zoning applicable to a portion of the school site), institution uses that meet all development standards are uses permitted outright. However, if an institution use in a multi-family zone does not meet all development standards, then approval of an administrative conditional use is required for the portion of the development in the multi-family zone. Seattle Land Use Code Sections 23.44.022 and 23.45.006 establish development criteria for institution uses in the SF and L-1 zones. These criteria are discussed further below.

Several sections of the Seattle Land Use Code are applicable to the proposed development alternatives for Seattle Country Day School. These include development standards for single-family zones, development standards and design requirements for institutional uses in single-family zones, and development standards for institutional uses in multi-family zones. Applicable sections of the code are briefly discussed below.

Development Standards for Single-Family Zones

Title 23 of the Seattle Municipal Code (Seattle Land Use Code), Sections 23.44.008 through 23.44.016, establish development standards for uses permitted outright in single-family zones. New or expanding institutional uses in single-family zones must comply with these standards, as well as additional requirements, unless modified elsewhere in the Land Use Code. Table 3-1 below summarizes these standards.

In addition to development standards for uses permitted outright, Section 23.44.022 of the Seattle Land Use Code establishes criteria for institution uses located within single-family zones. Development criteria for dispersion, demolition of residential structures, reuse of existing structures, noise and odors, landscaping, light and glare, bulk and siting, parking and loading, and transportation are established in the code. Each of these criteria are briefly discussed below.

Table 3-1. Development Standards for Uses Permitted Outright in Single-Family Zones (SMC Sections 23.44.008 through 23.44.016)

Element	Development Standards
Exterior Lighting	Lighting should be shielded and directed away from residentially zoned lots.
Tree Requirements	Trees should be maintained through either planting or development of a tree preservation plan.
Lot Requirements	The minimum lot size in the SF 5000 zone shall be 5,000 square feet (sf). The maximum lot coverage cannot exceed 1,750 sf or 35 percent of the lot area whichever is greater.[4]
Height Limits	Base structure height in single-family zones is established as 30 feet. Additional height is permitted if one or both adjacent structures exceed 30 feet, or if the lot is sloped, allowing one additional foot of height for each 6 percent of slope (on the downhill side of the structure only). An additional 5 feet is allowed for pitched roofs.
Transportation	Proposed uses must meet the transportation concurrency level-of-service standards as established in SMC Chapter 23.52.
Yards	Generally, front yards should be at least 20 feet, rear yards 25 feet, and side yards five feet. Variations of these requirements are based on the size of abutting yards; lot depth; the slope of the lot; and the location of the lot with respect to streets, corners, and alleys.
Parking	Parking is required as provided in SMC Chapter 23.54. Additionally, Chapter 23.44.016 requires that vehicular access to parking from an improved street, an alley, or easement be maintained. Generally, accessory parking must be located on the same lot as the principal use. (Please see the Transportation section for additional discussion of parking).

Administrative Conditional Use Criteria in Single-Family Zones

In addition to meeting development standards for uses permitted outright, institutions in single-family zones require approval of an administrative conditional use. The administrative conditional use application for the Seattle Country Day School project is included in Appendix B. Under the general criteria that apply to all administrative conditional uses in single-family zones (SMC 23.44.018), a conditional use can be conditioned or denied by DPD based on a determination as to whether the proposed use meets the criteria for establishing a specific conditional use and whether the use will be materially detrimental to the public welfare or injurious to property in the zone or vicinity that the property is located. DPD can also impose requirements to protect other properties in the zone or vicinity. The specific administrative conditional use criteria for institution uses from Section 23.44.022 used to evaluate and/or condition the use are as follows:

> **Dispersion –** The Seattle Land Use Code contains a dispersion requirement that must be met by new institution uses or expanding institution uses that include expansion of lot lines located in single-family zones. Generally, the distance between lot lines of one institution use and another must be at least 600 feet. However, a proposed institution may be located less than 600 feet from another institution if the intent of the dispersion

[4]Development can occur on a substandard lot containing a riparian corridor buffer, a wetland and wetland buffer, or a steep slope and steep slope buffer pursuant to the provisions of SMC Chapter 25.09, Regulations for Environmental Critical areas, provided the conditions in SMC 23.44.010.B.5.a and b apply.

criterion is achieved due to the presence of physical elements such as bodies of water; large open spaces or topographical breaks; or other elements such as arterials, freeways or nonresidential uses that provide substantial separation from other institutions (SMC 23.44.022.E.1.b).

Demolition of Residential Structures – No demolition of residential structures or change in use is allowed to provide for parking. This requirement can be waived if the demolition or change in use is necessary to meet the parking requirement of the Land Use Code and if alternative locations would result in greater noise, odor, light and glare or traffic impacts to surrounding properties. A waiver of parking requirements could include a limit to the number of parking spaces or waiver of parking development standards such as location or screening (SMC 23.44.022.F).

Reuse of Existing Structures – Existing structures may be converted to an institution use if the yard requirements for institutions are met. Existing structures that do not meet the yard requirements can be permitted to convert to an institutional use; however, they may be subject to additional mitigation measures to reduce impacts of the proposed use on surrounding properties (SMC 23.44.022.G).

Noise and Odors – All institution uses in a single-family zone must be designed and operated in compliance with the Seattle Noise Ordinance, Chapter 25.08 of the Seattle Municipal Code. In addition, as part of the administrative conditional use application review, DPD may consider the location on the lot of proposed facilities, on-site parking, outdoor recreation areas, trash and refuse storage areas, ventilating mechanisms, sports facilities, and other noise or odor-generating facilities. Mitigation measures to reduce the potential for noise and odors may include landscaping, sound barriers or fences, adjustments to yard or parking standards, setting hours of operation, or other measures (SMC 23.44.022.H). Section 3.3 of this Draft EIS provides a more thorough discussion of applicable noise requirements.

Landscaping – Landscaping is required to integrate the institution use with adjacent areas, and to reduce the potential for erosion or extensive stormwater runoff. Landscaping is used to screen parking areas and to generally reduce the appearance of bulk from adjacent streets and residentially zoned properties. Landscaping materials are required to be compatible with surrounding vegetation (SMC 23.44.022.I). See Section 3.3 Aesthetics for a discussion of landscaping.

Light and Glare – In addition to exterior lighting requirements established for uses permitted outright in residential zones, nonreflective surfaces are required to help reduce glare (SMC 23.44.022.J). Section 3.3 of this Draft EIS provides a more thorough discussion of light and glare.

Bulk and Siting – Section 23.44.022.K establishes design standards, and bulk and siting requirements for institution uses in single-family zones, including provisions for lot setbacks, height limits, and façade scale. The Aesthetics section of this chapter provides a detailed discussion of bulk and scale requirements applicable to this project. Refer to Section 3.3 for additional discussion.

Transportation Plan – The Seattle Land Use Code requires preparation of a transportation plan for proposed new institution uses within single-family zones, or

expanding institution uses that are larger than 4,000 square feet of structure area and/or will require an additional 20 or more parking spaces. DPD can determine the scope and level of detail required for the plan. Generally, the transportation plan should consider traffic, parking, parking overflow, safety, and the availability of public transit systems to serve the proposed project (SMC 23.44.022.M). The transportation plan is included as the Transportation Technical Report in Appendix C.

Variance Criteria in Single-Family Zones

Variances from the provisions of the Land Use Code can be requested, except to establish a use that is otherwise not permitted in the zone in which it is proposed. Variances are authorized according to the procedures set forth in SMC Chapter 23.76, *Procedures for Master Use Permits and Council Land Use Decisions*.

For single-family zones, if an institution use does not meet development standards (as is the case for Alternative 1 as to lot coverage), then a change to the standards requires approval of a variance, in addition to administrative conditional use approval. The variance criteria from Section 23.40.020 are as follows:

- Because of unusual conditions applicable to the subject property, including size, shape, topography, location or surroundings, that were not created by the owner or applicant, the strict application of this Land Use Code would deprive the property of rights and privileges enjoyed by other properties in the same zone or vicinity; and
- The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the vicinity and zone in which the subject property is located; and
- The granting of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zone or vicinity in which the subject property is located; and
- The literal interpretation and strict application of the applicable provisions or requirements of this Land Use Code would cause undue hardship or practical difficulties; and
- The requested variance would be consistent with the spirit and purpose of the Land Use Code regulations for the area.

When a variance is authorized, conditions may be attached regarding the location, character and other features of a proposed structure or use as may be deemed necessary to carry out the spirit and purpose of the Land Use Code (SMC 23.40.020).

The variance application for the Seattle Country Day School project is included in Appendix B.

Development Standards for Multi-Family Zones

Title 23 of the Seattle Municipal Code (Seattle Land Use Code), Sections 23.45.090 through 23.45.102, establish development standards for institutions in multifamily zones. New or expanding institutional uses in multi-family zones must comply with these standards. Table 3-2 below summarizes these standards.

Table 3-2. Development Standards for Institutions in Multi-Family Zones (L-1) (SMC Sections 23.45.090 through 23.45.102)

Element	Development Standards
Height Limits	Maximum structure height in multi-family zones is established as 25 feet. For gymnasiums and auditoriums that are necessary to an institution, the maximum permitted height shall be 35 feet if all portions of the structure above the height limit of the zone are set back at least 20 feet from all property lines. Additional height, of 1 foot for each 6 percent of slope, is permitted on sloped lots. An additional 10 feet is allowed for pitched roofs on the auditorium or gymnasium with a slope of not less than three to twelve (3:12) (SMC 23.45.092).
Structure Width and Depth	Maximum width in the L-1 zone without modulation or landscaping options is 45 feet. Maximum width with modulation and landscaping options is 75 feet (SMC 23.45.094.A.1). In order to reach the maximum permitted width, institutional structures are required to reduce the appearance of bulk through modulation or landscaping options. The maximum depth of institutional structures shall be 65 percent of the lot depth (SMC 23.45.094.B)
Setback Requirements	SMC 23.45.096 establishes setback requirements in multi-family zones. A front setback is determined by the average of the setbacks of structures on adjoining lots, but is not required to exceed 20 feet. In the L-1 zone, front setbacks cannot be reduced below an average of 10 feet; and no portion of the structure shall be closer than 5 feet to the front lot line. The minimum rear setback shall be 10 feet in the L-1 zone. Side setbacks shall be a minimum of 10 feet from residentially zoned lots and side streets and 5 feet in all other cases. When the depth of a structure exceeds 65 feet, an additional setback is required for that portion that exceeds 65 feet. This additional setback can be averaged along the entire length of the wall (SMC 23.45.096.2). Institutions are required to provide landscaping (trees, shrubs, grass, and evergreen ground cover) for setbacks that abut a street. Decorative features such as paving, sculptures or fountains are permitted but cannot exceed 25 percent of each required landscaped area.
Transportation	Proposed uses must meet the transportation concurrency level-of-service standards as established in SMC Chapter 23.52.
Parking	Parking is required as provided in SMC Chapter 23.54. Additionally, Section 23.45.098 requires that vehicular access to parking from an improved street, an alley, or easement be maintained. Generally, parking cannot be located in the required front or side street setbacks. Landscaping is required for parking lots for more than 20 cars. (See Section 3.4, Transportation below for additional discussion of Parking).
Noise, Odors, Light and Glare, and Signs	Institutions are required to meet noise control requirements established in SMC 25.08. Ventilation devices or other sources of odors shall be directed away from residential lots. Exterior lighting shall be shielded and directed away from principal structures on adjacent residentially zoned lots. Poles for freestanding exterior lighting are permitted to a maximum height of 30 feet (SMC 23.45.100).
Dispersion	The lot line of new or expanding institution must be located 600 feet or more from the lot line of any other institution. However, a proposed institution may be located less than 600 feet from another institution if the intent of the dispersion criterion is achieved due to the presence of physical elements such as bodies of water; large open spaces or topographical breaks; or other elements such as arterials, freeways or nonresidential uses that provide substantial separation from other institutions (SMC 23.45.102).

Administrative Conditional Uses in Multi-Family Zones

With respect to multi-family zones (such as the L-1 zoning applicable to a portion of the school site), institution uses that meet all development standards are uses permitted outright. However, if an institution use in multi-family does not meet all development standards, then approval of an administrative conditional use is required for the portion of the development in the multi-family zone. Phase 2 of both Alternatives 1 and 2 require approval of an administrative conditional use because the proposed school buildings in the L-1 zone exceed width and depth limitations.

Under the general criteria that apply to all administrative conditional uses in multi-family zones (Section 23.45.116), a conditional use can be conditioned or denied by DPD based on a determination as to whether the proposed use meets the criteria for establishing a specific conditional use and whether the use will be materially detrimental to the public welfare or injurious to property in the zone or vicinity that the property is located. DPD can also impose requirements and conditions to protect the public interest or other properties in the zone or vicinity. The specific administrative conditional use criteria for institution uses from Section 23.45.122 used to evaluate and/or condition the use are as follows:

> **Dispersion Criteria –** An institution not meeting the dispersion criterion may be permitted if it is determined that it does not substantially exacerbate parking shortages, traffic safety hazards and noise in the surrounding residential area.
>
> **Noise –** A permit may be conditioned to mitigate potential noise impacts. Measures that could be implemented include, but are not limited to, landscaping, sound barriers or fences, berms, parking development standards, and design modifications.
>
> **Bulk and Siting –** The needs of the institution should be balanced with that of the residential scale and character of the surrounding area. In order to achieve this, DPD can modify applicable development standards for modulation, landscaping, provision of open space, and structure width, depth and setbacks.
>
> **Transportation Plan –** A transportation plan is required for new or expanding institutions that are larger than 4,000 square feet of structure area and/or are required to provide more that 20 parking spaces. DPD determines the scope and level of detail required for the plan.

The transportation plan is included in Appendix C and is summarized in section 3.4. The administrative conditional use application for the Seattle Country Day School project is included in Appendix B.

3.2.2 Operation Impacts

This section of the Draft EIS identifies land use impacts associated with each proposed redevelopment alternative. The discussion of impacts includes both direct and indirect impacts, including compatibility with surrounding land uses and compliance with Land Use Code requirements and Development standards. Construction impacts related to land use are discussed in Section 3.5. Institution uses in single-family zones are conditionally permitted, and new or expanding institutions must receive approval of an administrative conditional use for the portion of the development in the single-family zone. With respect to multi-family zones (such as the L-

1 zoning applicable to a portion of the school site), institution uses that meet all development standards are uses permitted outright.

3.2.2.1 Alternative 1: Preferred Alternative

Alternative 1 would expand and redevelop the existing institution uses on the property. Alternative 1 would expand the facilities from approximately 43,000 square feet of classroom and administrative space to 77,000 square feet at the end of Phase 2; which would include two new 2-3 story academic buildings and a 10,000 square foot single-story parking garage beneath one of the buildings. On-site parking would increase by 31 parking spaces, in a combination of structured and surface parking. Site development would include a new access drive and onsite space for automobile queuing, surface parking, playfield areas, courtyard, and landscaping.

Alternative 1 would alter the site's land use patterns and increase the intensity of uses on the property. There would not be an expansion of the school's property boundaries; however, the campus size would increase with the change in use and expansion of the institutional uses. Specifically, Alternative 1 would reduce vegetated open space on the site and proportionately increase impervious area in structures, parking and load/unload zones. The new buildings would be located on the eastern portion of the site closest to the existing multi-family residential development to the east across 4th Avenue North. New activities such as site access, parking, and playgrounds would be located closer to the single-family homes to the south and west. As part of Phase 1, five single-family houses owned by Seattle Country Day School (houses 1, 2, 4, 5, and 6 on Figure 2-1a), a separate garage for house 6, and the dilapidated greenhouse would be demolished. The one remaining house on the school site (house 3) would be converted from single-family to school use. Four of the houses are currently rented as dwellings, and the project would displace existing single-family residents and housing. The change in the development pattern from residential to institution use would effectively foreclose single-family use of these properties and would also reduce the buffer the existing dwellings provide between the institutional uses on the site and the adjacent single-family residences to the north and west.

Alternative 1 would be generally consistent with applicable Comprehensive Plan policies for areas of the city that are outside of urban villages, single-family neighborhoods, and institutions and facilities in single-family residential areas, provided impacts are reasonably mitigated.

Table 3-3 below provides a comparison of Alternative 1 with applicable sections of the Seattle Land Use Code. Because the site falls within two land use zones (SF-5000 and L-1), the respective Land Use Code provisions apply. Where multiple sections of code apply, the most restrictive design requirement for each element is compared to Alternative 1. Alternative 1 would require approval of an administrative conditional use because the proposed school buildings in the L-1 zone exceed width and depth limitations. A variance for lot coverage would be required for Phase 2 to maintain a residential structure on the portion of the site that is zoned SF 5000.

Table 3-3. Comparison of Alternative 1 with Applicable Land Use Code Sections

Element	Requirement and Applicable Code Section	Alternative 1 design (Phases 1 and 2)
Lot Size and Coverage	Lot Size: no greater than 2.5 acres in SF 5000 zone unless the property proposed for expansion is substantially vacant. Lot Coverage: not more than 35 percent of site or 1,750 square feet in the SF-5000 zone (SMC 23.44.010).	Lot Size is 2.32 acres Lot coverage limit in the SF-5000 zone would be exceeded by 1.4 percent (to 36.4 percent) in order to retain an existing residential structure. Variance required for Phase 2 in order to maintain the existing residential structure.
Height Limits	Maximum base structure height is 30 feet in SF zone (SMC 23.44.012) and 25 feet in the L-1 zone (SMC 23.45.009), which is then adjusted for the sloping site as allowed by code.	Maximum above grade height: Phase 1: 32.5 feet and Phase 2: 28 feet; an additional 2 feet 9 inches (SF zone) and 2 feet 10 inches (L-1 zone) is permitted beyond the height limits to account for the sloping site; therefore, heights would be within the code limits in both the SF and L-1 zones.
Structure Width and Depth	SF zone - if façade length exceeds 30 feet in length, the City may require design features to minimize bulk. L-1 zone – Maximum building width with modulation and landscaping is 75 feet (SMC 23.45.094.A.1); the maximum depth of institutional structures shall be 65 percent of the lot depth (SMC 23.45.094.B)	SF zone - total façade length of 110 feet exceeds 30 feet in length; project includes design features to minimize bulk. L-1 zone – no changes in Phase 1; Phase 2 – proposed building façade with modulation is 114 feet which exceeds the allowable building width with modulation and landscaping; the proposed building depth of 106 feet 4 inches would exceed the 65percent allowable building depth of 78 feet in the L-1 zone; administrative conditional use required
Structure Setbacks	SF zone – Yard standards for uses permitted outright apply, except that a 10-foot setback is required from all side lot lines in SF zone (SMC 23.44.022); L-1 zone – front setbacks are the average of existing setbacks on structures on either side, but no less than 5 feet and no greater than 15 feet required; rear setbacks 20 feet or 20 percent of lot depth, whichever is less; side setbacks determined by structure depth and height.	SF zone – new structures would meet setback requirements of 10 feet.; the residential structure (house 3) that will remain and be converted to an institution use has a side yard of 7 feet 6 inches and does not meet side yard setback standards. L-1 zone – new structures with frontages along 4th Avenue North reflect existing setbacks (13 feet, 11 inches)
Parking	Requirements as established in SMC 23.54.015) for institutions in single-family zones (existing) would require 52 spaces total (Phase I) and 59 spaces total (Phase 2).	Phase 1: 54 spaces in surface parking lots Phase 2: 60 spaces in both below grade and surface parking lots

Element	Requirement and Applicable Code Section	Alternative 1 design (Phases 1 and 2)
Landscaping	Required to integrate the institution with adjacent areas, reduce potential for erosion/runoff, reduce coverage of site, screen parking from residentially zoned areas, and reduce appearance of bulk and scale (SMC 23.44.022.I).	Proposed landscape design includes building perimeters, parking areas, and site perimeter.
Exterior Lighting/ Light and Glare	Exterior lighting should be shielded and directed away from residential lots and the use of nonreflective surfaces are required (SMC 23.44.008.H; SMC 23.44.022.J).	The design would comply with lighting requirements.
Dispersion	Institution uses in SF zones must be 600 feet from one another, unless separated by physical (water, open space, topographical break) or structural (arterials, freeways, nonresidential structures) elements.	There are no institutions within 600 feet of Seattle Country Day School. Consistent with dispersion criteria.
Demolition of Residential Structures	No demolition of residential structures or change in use is allowed to provide for parking in SF zones (SMC 23.44.022.F). This can be waived if the demolition is necessary to meet parking requirements and if alternative locations would have greater noise, odor, light and glare, or traffic impacts. Demolition of residential structures for parking is permitted in L-1 zone.	Houses 4, 5, and 6 in the SF zone would be demolished for parking in Phase 1. In Phase 2, the site occupied by House 6 would be converted to a playfield.
Reuse of Existing Structures	Existing structures may be converted to an institution use if the yard requirements for institutions are met. Existing structures that do not meet the yard requirements can be permitted subject to additional mitigation measures to reduce impacts of the proposed use on surrounding properties (SMC 23.44.022.G).	The residential structure (House 3) that will remain and be converted to an institution use has a side yard of 7 feet 6 inches and does not meet side yard setback standards. In keeping with the scale and character of the surrounding neighborhood, no changes to the architectural character of the building or landscaping are proposed.
Noise and Odors	Institution uses in a single-family zone must be designed and operated in compliance with the Seattle Noise Ordinance, Chapter 25.08 of the Seattle Municipal Code. As part of the administrative conditional use application review, DPD may consider the location on the lot of proposed facilities, on-site parking, outdoor recreation areas, trash and refuse storage areas, ventilating mechanisms, sports facilities, and other noise or odor-generating facilities.	Noise generated by school operations would remain the same or increase slightly from existing levels. No significant sources of odor would result from the site operations. Trash and refuse storage areas would be located in the surface parking area at the northwestern side of the property during Phase 1 and in the parking garage at the completion of Phase 2; these areas would be screened from adjacent land uses.

For further discussion of the relationship to surrounding land uses and consistency with applicable municipal codes, see the Height, Bulk, and Scale and Light and Glare discussions in Section 3.3.

3.2.2.2 Alternative 2 – Reduced Lot Coverage

The type of impacts associated with buildout of Phases 1 and 2 under Alternative 2 would be the same those discussed under Alternative 1. However, under Alternative 2, an additional residential structure would be demolished to meet Land Use Code requirements for lot coverage. No variance would be required.

Demolition of the additional residence would eliminate a single-family structure that could serve as a buffer between the institutional uses on the site and adjacent single-family homes along Nob Hill Avenue and Newell Street. In addition, the single-family structure would be replaced with a playground, thereby introducing a more intensive use next to and across from residential homes. Although the playground location would provide some buffer between the residential uses and the institution buildings, adjacent residents could perceive this change in use from the single-family structure to a playground as a negative impact.

3.2.2.3 Alternative 3 – No Action

Under the No Action Alternative, existing land uses on the project site would likely continue at current levels. No construction or redevelopment would be anticipated in the near future on the project site.

3.2.3 Cumulative Impacts

There are currently no major land use proposals in the project vicinity that, when combined with the proposed action, would result in cumulative impacts. Projects such as the Fremont Bridge reconstruction that is scheduled to begin in 2005, is expected to divert vehicles to alternative routes. Some vehicles may travel through the area near Seattle Country Day School to avoid the construction area (See Section 3.4, Transportation).

The proposed school expansion and redevelopment of the school is not expected to create pressure for rezoning surrounding properties to allow higher density uses. Rezone proposals are considered based on strict criteria in the Land Use Code that do not favor a change from single-family to other zoning designations.

Demolition of the houses on site and expansion of the school could create pressure for those areas north and northeast of the site that are zoned multi-family and designated as such in the City's Comprehensive Plan to redevelop from single-family to multi-family residential uses.

3.2.4 Operation Mitigation

3.2.4.1 Alternative 1 – Preferred Alternative

Design measures contribute to the integration of the facility with surrounding land uses, which are primarily single-family residential. New buildings would be comprised of a variety of forms

and materials designed to both reduce the bulk and scale of the large buildings and integrate the buildings into the existing campus and surrounding neighborhood. For example, the new middle school will be built on a brick base that is similar to the materials on the original 1928 school building and gabled roofs will be used in selected locations to help the buildings to reflect the surrounding residential context and also mark the transitions in building heights.

Alternative 1 would concentrate new development at the eastern part of the site away from the majority of single-family residences. Perimeter landscaping, including a mix of trees, shrubs and groundcover, would provide shade, scale and screening of the campus from the surrounding neighborhood. Landscaping and plantings would be used to enhance the site and soften the scale of the new buildings. Plantings and fencing would also be used to screen adjacent residences from the new buildings, parking lots, and playfields. Large trees, shrubs and perennials would be used along the perimeter of the school site along 4th Avenue North and at the driveway exit along Nob Hill Avenue North. Figures 3-2, 3-3, 3-4 and 3-5 in Section 3.3 Aesthetics, illustrate how the different phases of construction would appear from surrounding viewpoints.

3.2.4.2 Alternative 2 – Reduced Lot Coverage

Similar to Alternative 1, proposed design measures to meet permit requirements would help to mitigate potential impacts associated with the increase in intensity of land use. No variance for lot coverage would be required with Alternative 2.

3.2.5 Significant Unavoidable Adverse Impacts

Both development alternatives would unavoidably increase the square footage of the institution use and the intensity of land use on the project site. Compliance with design requirements may reduce impacts.

3.3 Aesthetics

This section discusses existing conditions related to light and glare, bulk and scale of the existing school buildings, and existing noise sources within the project area. Light and glare, bulk and scale, noise impacts, and appropriate mitigation measures associated with operation of the build alternatives are also identified in this chapter. Construction impacts and mitigation are described in Section 3.5.

3.3.1 Affected Environment

3.3.1.1 Light and Glare

Current sources of light and glare emanating from the school are primarily associated with interior and outdoor lighting. Interior lights are generally turned off by 7:00 p.m. Approximately 35 after-school and weekend evening events occur throughout the year that extend the length of time interior lights are required until approximately 9:00 p.m. Exterior lighting, composed of low-intensity light sources, is used for security and safety throughout the school property during evening hours. Light fixtures are generally situated in a manner that

minimizes impacts to surrounding properties; however, at night, lighting at the school is noticeable on the north-facing slope of Queen Anne Hill in relation to light from surrounding residences.

Vehicle headlights also create light and glare impacts from the project site. Generally, most faculty, staff, and students arrive on campus between 7:30 and 8:30 a.m. on school days. Most students leave campus by 3:30 p.m. An extended-day program offers childcare for students before and after school and operates until 6:00 p.m. Considering the hours of school operation and general arrival and departure times of faculty, staff, and parent vehicles, headlight glare is noticeable to adjacent residences during the mornings of winter months, when the sun does not rise until close to 8 a.m. (U.S. Naval Observatory Website, 2004).

Seattle Country Day School hosts approximately 35 special events each year that are typically held in the evenings, on weekends, or during the summer. Evening events also result in traffic to and from the school, which subsequently adds another time headlight glare is detected by surrounding residents.

The Seattle Land Use Code (SMC 23.45.100) requires that lights be shielded or directed away from residential lots or principal structures on residential lots, and restricts the height of poles for lighting to a maximum of 30 feet in multi-family residential zoned areas. Chapter 23.44.022 of the Seattle Land Use Code requires exterior lighting to be shielded or directed away from adjacent residential lots and states non-reflective surfaces are to be used to help reduce glare in single-family residential zoned areas.

3.3.1.2 Bulk and Scale

Neighborhood Character

Seattle Country Day School is located on the north-facing slope of Queen Anne Hill, in the northeast area of the Queen Anne neighborhood. The surrounding neighborhood is developed and primarily includes single- and a few multi-family residences. Highway 99 to the east and Queen Anne Avenue North to the west are the main arterials providing access to the school.

Buildings in the Queen Anne neighborhood vary in scale, age of construction, and type of construction. Most of the buildings in the surrounding area are composed of single-family residences occupying single lots, with the exception of a two- to three-story condominium complex located directly across 4th Avenue North, east of Seattle Country Day School. A majority of the single-family residential properties are two stories, which average 25 to 35 feet in height, and are primarily comprised of wood construction, compared to Seattle Country Day School campus, which includes a series of interconnected two- to three-story buildings composed of a mix of brick, wood paneling, and concrete facades.

Off-Site Views

Due to the school buildings' physical size and composition compared to surrounding properties, the school is a prominent fixture along the north-facing slope of Queen Anne Hill. It can be viewed from the Ballard and Fremont neighborhoods when facing south across the Lake

Washington Ship Canal. Single-family residences are located immediately north, south, and west of Seattle Country Day School; a condominium complex is located to the east, across 4th Avenue North.

Due to the topography of the school site and surrounding area, the existing school building does not currently impede adjacent residences' views. As residences across Newell Street face south, school buildings are shielded from existing homes in front of Seattle Country Day School. Neighboring property owners to the south of the school site are able to view only school building roofs when facing north. Because properties south of the school are situated at a significantly higher elevation compared to the school site, views are not obstructed to the north toward the Ship Canal and Ballard and Fremont neighborhoods.

Figures 3-2, 3-3, 3-4, and 3-5 show current views of the project site from four locations adjacent to the project area. Schematic drawings are included from the same view perspective to provide a representation of how the different phases of construction would appear in the context of surrounding features. In each of the figures, an effort was made to match the artist's rendering with the photograph perspective as closely as possible. The figures show trees to illustrate how landscaping will help mitigate the bulk and scale impacts of the new buildings. Figures without the landscaping can be viewed in the Master Use Permit file maintained by DPD.

Viewshed

Public view protection policies described in the City of Seattle SEPA Ordinance (Chapter 25.05.675) are intended to:

> *protect public views of significant natural and human-made features: Mount Rainer, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water including Lake Washington, Lake Union, and the Ship Canal, from public places consisting of specified viewpoints, parks, scenic routes, and [other] view corridors.*

The scenic view that requires protection related to the proposed project is the Ship Canal from designated public places on the north side of Queen Anne Hill. As previously mentioned, the school facilities do not currently obstruct views of the Ship Canal due to the topography of the project site.

3.3.1.3 Noise

Overview

The human ear is receptive to a varying range of sound intensities. The decibel (dB) scale used to describe sound is a logarithmic rating system used to describe audible sound intensities within a practical range of measurements. A change in sound pressure levels of 10 dB is roughly perceived as halving or doubling loudness. Therefore, a 70-dB sound level will generally be perceived as twice as loud as a 60-dB sound level. Differences of 1 dB are generally indistinguishable to humans; however, differences of 2 or 3 dB can be detected under ideal laboratory conditions, and a change of 5 dB is discernible under normal conditions.

Existing

Phase 1 - View of the new middle school building
(Approximate tree maturity in 2006)

Phase 2 - View of the new classroom and administration building
(Approximate tree maturity in 2010)

ADOLFSON

NORTH
No Scale

File name: Fig3_2.ai
Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 3-2.
VIEW FROM 4TH AVE N AND RAYE ST, FACING NORTHWEST
SEATTLE COUNTRY DAY SCHOOL EXPASION, DRAFT EIS
SEATTLE, WASHINGTON

Existing

Phase 1 - View of the new middle school building and new access drive
(Approximate tree maturity in 2006)

Phase 2 - View of the new classroom and administration building
(Approximate tree maturity in 2010)

ADOLFSON

NORTH
No Scale

File name: Fig3_3.ai
Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 3-3.
VIEW FROM 4TH AVE N AND NEWELL, FACING SOUTHWEST
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

Existing

Phase 2 - View of the new classroom and administration building and parking lot
(Approximate tree maturity in 2010)

ADOLFSON

NORTH
No Scale

File name: Fig3_4.ai
Original graphic by: JAB
Edits by:
Date: 05/18/04

Source:
Carlson Architects

FIGURE 3-4.
VIEW FROM NEWELL, FACING SOUTH
SEATTLE COUNTRY DAY SCHOOL
EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

Existing

Phase 2 - Alternative 1
View of the new main building and administration building

Phase 2 - Alternative 2
View of the new main building, administration building and play area

ADOLFSON

NORTH
No Scale

File name: Fig3_5.ai
Original graphic by: JAB
Edits by:
Date: 05/19/04

Source:
Carlson Architects

FIGURE 3-5.
VIEW FROM NOB HILL, FACING SOUTH
SEATTLE COUNTRY DAY SCHOOL EXPASION, DRAFT EIS
SEATTLE, WASHINGTON

Since the human ear is not equally sensitive to all sound frequencies, it is necessary to consider the frequency response of the human ear. A-weighting is the frequency-weighting most often used because it corresponds closely to the human perception of loudness. Measurements from instruments using this system are reported in "A-weighting decibels," or dBA. All noise levels discussed in this EIS are reported in dBA.

Typical sound levels produced by common noise sources are listed in the following table (Table 3-4).

Table 3-4. Sound Levels Produced by Common Noise Sources

Thresholds/Noise Sources	Sound Level (dBA)	Subjective Evaluations	Possible Effects on Humans
Rocket Launching Pad (no ear protection)	180		Irreversible hearing loss
Human Threshold of Pain Carrier jet takeoff at 50 feet	140	Painfully Loud	Continuous exposure to levels above 70 can cause hearing loss in majority of population
Siren at 100 feet Thunderclap	130	Deafening	
Jet takeoff at 200 feet Auto horn at 3 feet	120	Maximum Vocal Effort	
Chain saw Pile Driver	110	Extremely Loud	
Lawn mower at 3 feet Noisy motorcycle at 50 feet Garbage Truck Firecrackers	100	Very Loud	
Heavy truck at 50 feet City Traffic	90		Very annoying Hearing Damage (8 hrs)
Pneumatic drill at 50 feet Busy urban street, daytime	80	Loud	Annoying
Normal automobile at 50 mph Noisy Restaurant Freeway Traffic Business Office	70		Telephone use difficult
Air conditioning unit at 20 feet Conversation at 3 feet	60	Moderate	Intrusive
Quiet residential area Light auto traffic at 100 feet	50		Sleep Interference
Living Room Bedroom Quiet home	40	Faint	
Soft whisper at 15 feet Library	30		Very quiet
Slight rustling of leaves	20	Very Faint	
Broadcasting Studio	10		Just audible
Threshold of Human Hearing	0		Hearing begins

Note that both the subjective evaluations and the physiological responses are continuums without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.

Source: U.S. Environmental Protection Agency (EPA), 1974 and City of Seattle Department of Planning and Development Website, 2004.

Seattle Noise Standards

The City of Seattle's Municipal Code sets forth maximum permissible sound levels (SMC 25.08.410). These noise levels are shown in Table 3-5. Between the hours of 10:00 p.m. and 7:00 a.m. on weekdays and 10:00 p.m. and 9:00 a.m. on weekends. The levels shown in Table 3-5 are reduced by 10 dBA where the receiving property lies within a residential district of the City.

Table 3-5. Maximum Permissible Sound Levels for the City of Seattle

Noise Source	Receiving Property [dBA]		
	Residential	Commercial	Industrial
Rural	52	55	57
Residential	55	57	60
Commercial	57	60	65
Industrial	60	65	70

The City of Seattle has also established noise parameters for construction equipment operations. Between the hours of 7:00 a.m. and 10:00 p.m. on weekdays and 9:00 a.m. and 10:00 p.m. on weekends and holidays (listed below) noise levels as described above and listed in Table 3-6 may be exceeded. Specific permissible dBA exceedances for construction and equipment operations are outlined in SMC 25.08.425 and summarized in Table 3-6.

Table 3-6. City of Seattle Permissible Exceedances for Construction and Equipment Operations

Noise Type	Allowable Time Period (weekdays)	Allowable Exceedance
Equipment on Construction Sites	7:00 a.m. and 10:00 p.m.	25 dB(A)
Portable Powered Equipment	7:00 a.m. and 10:00 p.m.	20 dB(A)
Powered Equipment used in Temporary or Periodic Maintenance or Repair of Residential Property	7:00 a.m. and 10:00 p.m.	15 dB(A)
Impact Construction Equipment	Any one-hour period between 8:00 a.m. and 5:00 p.m.	Not to exceed: 90 dB(A) continuously 93 dB(A) for 30 minutes 96 dB(A) for 15 minutes 99 dB(A) for 7.5 minutes

Source: SMC 25.08.425

The following is a list of designated holidays identified by the City of Seattle and the month the holiday is observed:

New Year's Day (**January**)
Martin Luther King Jr. Day (**January**)
Presidents Day (**February**)
Memorial Day (**May**)
Independence Day (**July**)
Labor Day (**September**)
Veteran's Day (**November**)
Thanksgiving Day and the Day Following Thanksgiving (**November**)
Christmas Day (**December**)

Existing Sources of Noise

Noise sources within and near the Seattle Country Day School site are primarily associated with passenger vehicle traffic. Traffic noise is noticeable throughout the project area due to the site's proximity to 4th Avenue North, Newell Street, and Nob Hill Avenue North. Traffic noise in the immediate vicinity increases with increased traffic during days of school operation, especially during student pick-up and drop-off periods in the early morning and mid-afternoon.

The play area used by students at the southern end of the project site during physical education classes and recess is an additional source of noise that is detectable by surrounding residents. Noise from the play area is generally associated with talking, yelling, and whistles and is primarily detectable to residents south of the school. The steep slopes to the south of the play area likely reduce the noise impacts to adjacent properties.

3.3.2 Operation Impacts

3.3.2.1 Alternative 1

Light and Glare

Light and glare concerns at schools are generally associated with lights for athletic fields rather than school building lighting. No significant impacts to light and glare are expected from the Phase 1 and 2 facilities at the Seattle Country Day School site. The proposed playfields will not be lighted. The primary source of lighting would continue to be from interior and exterior lights, which would be illuminated in a manner that would have minimal impact to surrounding residents. The lighting design would adhere to the 2002 Washington non-residential energy code as adopted by the City of Seattle. Lighting would be used that is high color rendering, energy efficient, with long life sources.

Exterior lighting would be used to illuminate parking lots, exterior walkways and stairs without creating light spill into the neighboring properties. All exterior lighting would be cut-off type and would be limited to those areas that require illumination at night for safety and security. Exterior lighting is not proposed at the new outdoor playfields.

The school currently proposes to use cut-off Type III distribution metal halide lighting fixtures on approximately 15-foot high poles at the north edge of the visitor lot. The school will consider other types of lighting that would reduce spillover during final design.

The underground parking lot that would be constructed during Phase 2 would be illuminated with surface mounted metal halide parking garage fixtures to achieve lighting levels for safety and guidance during hours of darkness as prescribed by the Illuminating Engineering Society (IES).

The buildings' interior lighting would use automated time clock controls that would turn lights off automatically after hours. Interior lights are normally turned off by 7:00 p.m.

Vehicle headlights would impact a few homes adjacent to the new parking lots and new access drive through school campus. As vehicles enter the parking lot located on the northeast corner of the project site from 4th Avenue North, headlight beams would aim toward a home along Newell Street. The home on the west side of Nob Hill Avenue North adjacent to the school property would incur the most impact from vehicles lights due to its proximity to the parking lot proposed as part of Phase 1 construction and due to its location directly across the new access drive. As vehicles park in the northern stalls, headlight beams would aim toward the adjacent property. Similarly, as vehicles head west along the access drive, headlights would cause glare toward the property directly across Nob Hill Avenue North. At the completion of Phase 2 construction, the home along Nob Hill Avenue North would not experience lighting impacts from an adjacent parking lot since it would be converted to a playfield. The two residential properties would be impacted during morning and evening hours during winter months as faculty arrive and leave the school and during early drop-off. Student pick-up generally occurs during daylight hours and would not cause light and glare impact to adjacent properties.

The number of special events at the school could increase by up to three additional events in the future with the development proposal. For those events that occur at night, there would be a proportional increase in vehicle traffic and subsequent glare impacts to the surrounding neighborhood.

Bulk and Scale

The greatest aesthetic impact to the properties surrounding the Seattle Country Day School property is related to the size and area the new school buildings would occupy and to the removal of several residential properties that would change the overall visual character of the school site.

At the completion of Phase 1 construction, the new middle school building that would be located on the southeast corner of the school property would be approximately 32.5 feet above grade to the top plate and 33 feet to the ridge and would occupy 20,726 square feet in an area that is currently occupied by a parking lot. The new building would change the appearance of off-site views toward the school property, especially for residents across 4th Avenue North, since a new school building would occupy an area currently containing no structures (Figures 3-2 and 3-3).

According to the Seattle Land Use Code, building height is restricted to a maximum of 30 feet in SF-5,000 zoned lots and a maximum of 25 feet in L-1 zoned lots. However, buildings on sloped

lots such as Seattle Country Day School are allowed to exceed established height limits at the rate of one additional foot for each six percent of slope. Therefore, an additional 2 feet, 9 inches and 2 feet, 10 inches is permitted beyond height restrictions on the SF-5,000 and L-1 zoned areas on-site, respectively. The proposed new buildings meet these requirements

The new classroom and administration building that would be constructed during Phase 2 would rise 28 feet to the ridge and would occupy 26,253 square feet (as opposed to the 28 foot-high, 12,956 square foot middle school building currently occupying this part of the site). The new classroom and administration building that would be constructed during Phase 2 would incorporate the same exterior design described for the new middle school building described in Section 3.3.4.2. The emphasis on the Phase 2 building would be to develop a strong "front-of-school" adjacent to the access drive (Figure 3-4).

The greatest change to off-site views would relate to residents facing south toward the school, as views would change from residential homes to a new three-story classroom and administration building that would be separated by a parking lot and the new access drive (Figure 3-4). Off-site views would also be changed for residents on the west side of Nob Hill Avenue North since the school site formerly composed of two-story residential properties would be changed to a paved access drive and playfield at the completion of Phase 1, with the new classroom and administration building with underground garage replacing the playfield at the completion of Phase 2 (Figure 3-5). The residential property along Nob Hill Avenue North directly north of the school property, in addition to experiencing a change in view facing east, would also be impacted by the removal of the on-site home, identified as House 6 in Figure 2-1a. House 6 would be demolished and changed into a 19-stall parking lot at the completion of Phase 1 and then changed into a playfield at the completion of Phase 2.

Additional residential properties south and west of the project site are not expected to notice a significant change to on-site views. Residential properties along 3rd Avenue North are situated in a lower topographical area, and currently do not have a view of the school. The proposed new facilities would not be viewable by these residents. Residents south of the school site are situated at a higher topographical area compared to the school, and currently have a view of building rooftops. The proposed project would result in a similar view to residents south of the school; however, the building rooftops would be a combination of existing materials and green roofs. No public views would be impacted by the project.

In general, the new school buildings would be much larger in scale than the existing residential buildings on the site and in the surrounding neighborhood. Construction of the new facilities would result in what some may consider a significant change in the visual character of the site.

Noise

No new sources of noise are anticipated with the construction of the new school buildings proposed during Phase 1 and Phase 2. Student enrollment is not expected to increase as a result of the improved facilities; therefore, the proposal would not increase vehicles traveling to and from the site or increased noise from an increased student population.

The greatest long-term impact that would occur with the implementation of the proposed Seattle Country Day School improvements involves the new outdoor playfields that would be constructed. At the completion of Phase 1, a new outdoor playfield would be located in the central area of campus, directly east of the new roundabout on Nob Hill Avenue North (Figure 2-1b). Phase 2 would move the playfield from the center of campus to the area directly west of the new Nob Hill Avenue North roundabout, between the primary school building and a residential home (Figure 2-2a). Students would use the outdoor play areas for both physical education classes and/or recess, weather permitting. Physical education classes occur throughout the school day (from 8:30 a.m. until 2:50 p.m.) and recesses normally occur between 10:45 a.m. and 1:00 p.m. The maximum number of students attending a single recess period can reach 132 children. Students attending after-school programs, which operate until 6:00 p.m., would also use the outdoor playfields.

In addition to student use of the outdoor play areas, the public would be allowed to use the playfields when school is not in session. However, the new playfields would not be regularly scheduled for use by local athletic organizations or leagues and would not be lighted for use at night.

The surrounding neighborhood would be subject to noise typically associated with outdoor playfields during school hours and during public use of the fields including talking, yelling, and whistles. Hours of operation would be restricted to daylight hours since no lighting would accompany the new fields. Noise levels would not exceed maximum permissible sound levels established in the Noise Ordinance of the Seattle Municipal Code (Chapters 25.08.425).

The mechanical systems for the new facilities will be housed in the basement of the new middle school building, on the south side. The equipment will be enclosed and below ground, so no noise impacts are expected to neighbors. In addition, the school will utilize natural ventilation, reducing the need for fans and the associated noise.

3.3.2.2 Alternative 2

Light and Glare

At the completion of Phase 1 of the project, light and glare impacts would be similar to those described for Phase 1 under Alternative 1.

With the demolition of the residential home at 2632 Nob Hill Avenue North (House 3) proposed with Phase 2 construction, long-term light and glare impacts would differ from Alternative 1. With the removal of the home, residents at the corner of Nob Hill Avenue North and Newell Street would have a direct view of the school buildings. Interior and exterior lights would be noticeable to residents of this property when facing south. Impacts from vehicle headlights using the new access drive are not anticipated to adversely affect residents at the corner lot since the access drive is situated at a higher elevation compared to the house.

Bulk and Scale

Long-term impacts associated with bulk and scale of the building at the completion of Phase 1 would be similar to impacts discussed for Alternative 1.

Phase 2 would change the appearance of the northern portion of the school campus with the removal of a single-family residential home as part of Alternative 2. Certain homes across Newell Street, north of the school property, would have an unobstructed view of the school facility when facing south due to the removal of the home on Nob Hill Avenue North. No public views would be impacted by the project.

Noise

Long-term noise impacts associated with Phase 1 would be similar to those discussed under Alternative 1.

For Phase 2, Alternative 2 includes the construction of a play area adjacent to the access drive (Figure 2-2b). As previously discussed under the noise impacts for Alternative 1, noise expected from playfields could impact adjacent properties throughout school hours and as the public uses the playfields. Noise impacts could include a mix of talking, yelling, and whistles.

3.3.2.3 Alternative 3 – No Action

There would be no changes from existing conditions associated with the No Action Alternative; therefore, no operational impacts would occur.

3.3.3 Cumulative Impacts

No cumulative impacts have been identified that would affect aesthetic resources.

3.3.4 Operation Mitigation

3.3.4.1 Light and Glare

Lighting impacts from the parking lots and security lighting can be minimized by compliance with the Seattle Land Use Code's provisions requiring that lighting be shielded and directed away from adjacent properties.

As required in Section 23.44.022 in the Seattle Municipal Code, a combination of landscaping and fences would be installed along the perimeter of the parking lots adjacent to residential properties to screen the homes from vehicles and related glare from headlights (Figure 3-4). Landscaping that would include low-lying shrubs and fencing along the perimeter of the parking lots would be incorporated to reduce the glare of headlights on adjacent properties (Figure 3-4). Specific mitigation measures that would be incorporated are described based on their location with the project area.

Alternative 1

Phase 1 parking lot west of the turn-around. A six-foot wood fence with a mix of large shade trees and multi-stemmed trees would be installed along the northern edge of the parking lot to act as a buffer to the adjacent house.

Phase 1 playfield. A six foot vinyl fence would be installed along the west and north sides of the playfield.

Phases 1 and 2 parking lot at the corner of 4th Avenue North and Newell Street. Screening shrubs would be installed to provide a 4 to 6 foot evergreen screen of the parking lot from the surrounding properties. Vine plantings would be used to lessen the visual impact of the retaining walls associated with this parking lot.

Phases 1 and 2 access drive and associated parking. Screening shrubs would be installed to provide a 4 to 6 foot evergreen screen and a mix of large shade trees and multi-stemmed trees would also be installed to buffer the new drive and parking stalls from the surrounding neighborhood.

Alternative 2

Operation impacts would be similar to those previously described for Alternative 1, with the exception of additional screening that would be required for a play area that would replace House 3 on the northern area of the project site (Figure 2-2). A combination of landscaping, including screening shrugs, and fencing would be used to screen the play area from surrounding residents.

3.3.4.2 Bulk and Scale

Alternatives 1 and 2

The new buildings would be composed of a variety of forms and materials designed with the intent to both reduce the scale of the large buildings and integrate the buildings into the existing campus and neighborhood. The new middle school building would be built on a brick base, which is similar to the materials on the existing primary building. The upper area of the building would include flat roof blocks broken up with triangular-roof (gabled) forms that blend with the residential context and mark the transitions in building height as the building steps down the hill. The new buildings' exterior materials would include painted siding, metal panels, and aluminum-framed windows. Portions of the new middle school building and new classroom and administration building roofs would be largely composed of vegetation and with the intent of achieving the appearance of typical flat garden roofs, with walking terraces in selected locations and shingled gabled portions (Figure 3-2). The roofs are intended to improve the view of the school from above and provide for energy-efficiency and microclimate conditions. Figures 3-2 through 3-5 depict schematic images of the school property as it would appear to residents east and south of the school at the completion of Phase 1 and Phase 2. Additional sitework, including

the new access drive and landscape elements, are also appropriately scaled to the surrounding neighborhood.

In addition to exterior design, the architects propose to incorporate landscaping and plantings to minimize the scale of the new buildings on the site perimeter. Large trees, shrubs, perennials, and groundcovers would be used along the perimeter of the school site along 4th Avenue North, Newell Street, and at the entry along Nob Hill Avenue North (Figures 3-2 through 3-5), reducing the visual impact of new buildings to neighboring properties north and east of the school. Plantings, fencing, and retaining walls would also be used to screen adjacent residences from parking lots and playfields. Figure 3-4 shows a view of the northeast parking lot from across Newell Street. Existing mature trees along the east side of Nob Hill Avenue North already provide a visual buffer from the school for residents across the road, as shown in Figure 3-5. Figures 3-2 through 3-5 depict the approximate size of the trees at the end of the construction phases.

3.3.4.3 Noise

Alternatives 1 and 2

No operational noise impacts were identified, therefore, no mitigation is necessary.

3.3.5 Significant Unavoidable Adverse Impacts

The greatest long-term impact to aesthetic resources is the proposed physical modification to the school site. Five residential homes would be removed and replaced with new school buildings, outdoor playfields, parking lots, and an access drive in Alternative 1, and six residential houses would be removed in Alternative 2 and replaced with school uses. Building design and landscaping would be incorporated to help blend the new school facilities with the surrounding neighborhood, but the visual change in the site would still be prominent.

3.4 Transportation

The following section describes the existing traffic patterns and volumes at Seattle Country Day School, including drop-off and pick-up arrangements, site access, parking, bus operations, special events, and safety. Impacts of the three alternatives on transportation are discussed and recommended mitigation measures are described. The information in this section is taken from the *Transportation Technical Report Seattle Country Day School MUP #2302435* (Heffron Transportation, Inc., 2004) included as Appendix C.

3.4.1 Affected Environment

3.4.1.1 Existing Site Description

Seattle Country Day School is located on the north side of Queen Anne Hill. It is bounded by 4th Avenue North on the east, Newell Street on the north, Nob Hill Avenue North on the west, and a steep hillside on the south (See Figure 1-1).

Most students arrive on campus between 7:30 and 8:30 a.m. on school days. The school day begins at 8:15 a.m. and 8:30 a.m. for the middle and lower schools, respectively. Pick up for grades K through 3 begins at 2:50 p.m. Pick up for grades 4 through 8 and carpools begins at 3:10 p.m. Students not participating in after-school activities usually leave school by 3:30 p.m.

There is also an extended-day program at the school as described in Section 1.2. This program offers childcare for students before and after school. The program operates between 7:30 and 8:30 a.m. and between 2:50 and 6:00 p.m. when school is in session. According to school staff, there are approximately 20 students in the before-school program and about 55 students in the after-school program. Morning drop-off occurs between 7:30 and 8:00 a.m. and afternoon pick-up typically occurs between 4:00 and 6:00 p.m.

Most faculty and staff travel to and from the school via private vehicle (either alone or in carpools). They arrive at school between 7:30 and 8:30 a.m. and leave between 3:00 and 6:30 p.m. with the majority leaving between 4:00 and 5:00 p.m.

3.4.1.2 Roadway Network

The study area for this analysis was determined based on those roadways and intersections currently used for access to the school and that could be affected by the school redevelopment project. The study area for the transportation analysis includes the roadways and intersections listed in Table 3-7.

Table 3-7. Roadways and Intersections Included in Transportation Analysis

North/South Roadways	East/West Roadways	Intersections
• 4th Avenue N	• Queen Anne Drive	• Nickerson St/3rd Ave N/ Florentia St
• Nob Hill Avenue N	• Newell Street	• Queen Anne Dr/4th Ave N/Raye St
• 3rd Avenue N	• Florentia Street	
• Mayfair Avenue N	• Nickerson Street	
• Warren Avenue N		

The existing roadway conditions are described in the *Transportation Technical Report* (Appendix C).

3.4.1.3 Traffic Volumes

Existing School Trips

School-related trip generation was determined by performing a transportation survey at Seattle Country Day School in November 2003. Surveys were developed for faculty, staff, and parents to determine the mode of travel and travel routes used to and from school on an average school day. Copies of the survey forms are in Appendix 1 of the *Transportation Technical Report* (Appendix C). Completed surveys were received from 77 percent of school faculty and staff (43 of the 56 faculty or staff) and 57 percent of school families (133 of the 235 families representing 177 of the 303 students)[5]. The survey results were used to determine the percentage of faculty or staff and students who use each mode of travel. The information was then applied to the school's entire population. The mode of travel used is summarized in Table 3-8.

Table 3-8. Seattle Country Day School Modes of Travel

	Number of persons	Drive Alone	Carpool [a]	Drop-off Pick-up [b]	Walk, Bike, Other	Total
Faculty or Staff	56					
To/From School		49 (88%)	3 (5%)	0 (0%)	4 (7 %)	56 (100%)
Students	303					
To School		0 (0%)	12 (4%)	279 (92%)	12 (4%)	303 (100%)
From School		0 (0%)	6 (2%)	291 (96%)	6 (2%)	303 (100%)

Source: Heffron Transportation Inc., 2004

a For this survey, a faculty or staff "carpool" was defined as someone who drove with others and parked at the site. A student "carpool" was defined as a student who was driven to school by someone who would park at school for the day.

b Drop-off/pick-ups for students include parent who drop off or pick up one or more children.

As shown, most faculty or staff drive themselves to and from school and use the same travel mode in the morning and afternoon. The vast majority of students are dropped off in the morning and picked up in the afternoon, while a few carpool and walk to school. The percentage using each mode of travel differs slightly before and after school. A few students who carpool or walk to school in the morning are picked up after school. The mode of travel percentages are consistent with findings at other independent K through 8 schools located in Seattle neighborhoods where public transit options are limited.

Daily trips generated by the school on an average day were estimated based on the survey information presented above and are shown in Table 3-9. Daily trip generation was estimated by assuming that each driver, visitor, and delivery requires two trips per day—one to the school and one from the school. Drop-off vehicles were assumed to make four trips per day—two trips in the morning (to and from the site), and two trips in the afternoon. Based on the survey data, each parent-driven vehicle drops off or picks up an average of about 1.5 students.

[5] The trip generation is based on an enrollment of 303 students. Enrollment has increased by two students and is now 305 students. The increase of two students would slightly increase existing trip generation numbers, but does not affect future traffic projections because those projections were based on an enrollment of 328.

Table 3-9. Existing Seattle Country Day School Trip Generation Estimates [a]

Trip Type	Daily Trips [b]	AM Peak Hour Trips (7:30 to 8:30 A.M.)			School PM Peak Hour Trips (2:30 to 3:30 P.M.)			PM Peak Hour Trips (5:00 to 6:00 P.M.)		
		In	Out	Total	In	Out	Total	In	Out	Total
Faculty or Staff	116	40	0	40	2	3	5	1	32	33
Parents	748	181	181	362	157	155	312	9	9	18
Shuttle Bus	10	0	0	0	1	0	1	0	0	0
Visitors/Deliveries [c]	70	0	0	0	0	0	0	0	0	0
Total	944	221	181	402	160	158	318	10	41	51

Source: Heffron Transportation Inc., 2004.

a. Based on 303 students and 56 faculty or staff.

b. Two trips were assumed for each SOV, HOV, and visitor (one trip to the site and one trip from the site), and four trips were assumed for each drop-off/pick-up vehicle (two trips in morning/two in afternoon). Faculty or staff were assumed to make 12 additional trips per day for meetings or off-site errands. Based on information gathered from SCDS, approximately 1.5 students are dropped-off or picked-up per vehicle.

c. Thirty visitors were assumed on an average day for a total of 60 trips. No visitor trips were assumed to occur during the peak hours. Five deliveries were assumed on an average day including mail, Federal Express, UPS, and two others (such as food, office supplies, cleaning supplies, or recycling); each delivery accounts for two trips (one entering and one exiting).

Trips occurring in the peak hours were estimated based on information provided by faculty or staff, and parents regarding typical school arrival and departure times. According to Seattle Country Day School staff, the school has an average of 30 visitors per day and about five deliveries. These trips were assumed to occur throughout the day, but were not assumed to occur during the peak hours. This analysis assumes that all students, faculty, and administrative staff would be on site on an average day. Since it is likely that some students, faculty, and staff would be absent on an average day, this assumption provides for a conservatively high estimate of trip generation and represents a worst-case condition. About 43 percent of the school's daily trips occur in the AM peak hour, 34 percent occur in the school's PM peak hour, and about 5 percent occur in the commuter PM peak hour.

In addition to travel mode, the transportation survey requested information from faculty or staff and parents about travel routes to and from the school in the morning and afternoon. This information, along with traffic volume and on-street parking count data described in subsequent sections, was used to determine travel routes used by faculty, staff, and parents on an average school day. This information was compiled in the *Transportation Technical Report* (Appendix C). The travel pattern information from the surveys was used to assign the school's trips to the roadway network. These assignments are shown on Figures 5 and 6 in Appendix C for the most intensive before- and after-school periods. The highest number of AM peak hour school-related trips occurs on 4th Avenue North between the school and Queen Anne Drive (221 trips). The next highest school-related volume during the AM peak hour occurs on Newell Street between Nob Hill Avenue North and 4th Avenue North (161 trips). However, traffic volumes on this section of Newell Street (between Nob Hill Avenue North and 4th Avenue North) may be higher due to vehicles circulating for parking spaces and maneuvering to get into the queue to access the drop-off area.

The after-school traffic volumes are slightly lower than those in the morning because most faculty or staff leave later in the day and some children attend the extended-day program after school. The highest number of afternoon school-related trips in the school PM peak hour (2:30 to 3:30 p.m.) occurs on 4th Avenue North between the school and Queen Anne Drive (163 trips)—about 25 percent less than in the AM peak hour. The next highest school-related volume during the school PM peak hour occurs on Newell Street between Nob Hill Avenue North and 4th Avenue North (140 trips). As noted for the AM peak hour, traffic volumes on this section of Newell Street may be even higher in the afternoon due to vehicles circulating for parking spaces and maneuvering to get into the queue to access the pick-up area.

Comparison of School Trips to Total Traffic Volumes

The school currently generates trips that travel on adjacent access streets and through nearby arterial intersections. Table 3-10 shows the percentage of school-related trips compared to the total traffic volume through the study area intersections and on adjacent roadways during the AM and school PM peak hour. As shown, school trips account for between 6 and 92 percent of the total traffic volumes during the AM peak hour, and between 6 and 86 percent of the total traffic volumes during school PM peak hour. The highest percentages occur on the access streets located adjacent to the school and on the main access routes to and from school. The lowest percentages occur at the nearby arterial intersections.

Table 3-10. Existing Seattle Country Day School Trips as a Percentage of Total Traffic Volumes

Location	Total Traffic Volumes	Existing Seattle Country Day School Trips	Percent Seattle Country Day School Trips
AM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,084	230	21%
Nickerson/3rd Ave N/Florentia St Intersection	2,210	128	6%
4th Avenue N, south of school	245	221	90%
Newell St, east of 3rd Ave N	162	111	69%
Newell St, west of 3rd Ave N	98	37	38%
3rd Ave N, north of Newell St	95	74	78%
School PM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,103	181	16%
Nickerson/3rd Ave N/Florentia St Intersection	1,851	107	6%
4th Avenue N, south of school	198	163	82%
Newell St, east of 3rd Ave N	115	99	86%
Newell St, west of 3rd Ave N	82	38	46%
3rd Ave N, north of Newell St	76	61	80%

Source: Heffron Transportation Inc., 2004

Background Traffic

Traffic volume data in the site vicinity were collected from several sources. Seven-day machine counts on Queen Anne Drive, Nickerson Street, 3rd Avenue North, and Florentia Street were obtained from the City of Seattle. New three-day machine counts were performed specifically for this project on 4th Avenue North, Newell Street, and 3rd Avenue North in February 2004.

In addition to the machine counts performed in the site vicinity, AM peak hour and school PM peak hour turning movement counts were compiled from recent and new counts taken in the project study area. New AM peak hour and school PM peak hour traffic counts were performed in February 2004 at the Queen Anne Drive/4th Avenue North/Raye Street intersection located south of the school, and at the school's main site access driveway on 4th Avenue North. In addition, a count was performed on Nob Hill Avenue North and 4th Avenue North, north of Newell Street, during the peak afternoon pick-up period in February 2004. Peak hour turning movement counts for the AM and school PM peak hour were developed for the Nickerson Street/3rd Avenue North/Florentia Street intersection based on recent Seattle Department of Transportation machine counts (November 2003) and a turning movement count in the *Seattle Pacific University Major Institution Master Plan* (The Transpo Group, September 1999). Traffic volumes at the two study area intersections represent the AM peak hour volumes that occur between 8:00 and 9:00 a.m. (see Figure 9 in Appendix C). Traffic volumes to and from 3rd and 4th Avenues North were increased to match the peak volumes that occur on the adjacent access streets between 7:30 and 8:30 a.m. This provides for a conservatively high estimate of traffic volumes in the site vicinity and assumes that the peak hour of the school could overlap with the peak hour of the adjacent arterials. See Figure 10 in Appendix C for existing (2004) school PM peak hour traffic volumes.

Comparison of Additional Traffic Counts

At the request of DPD, additional three-day traffic counts were performed in the vicinity of Seattle Country Day School beginning Tuesday, April 13 through Thursday, April 15, 2004 when SCDS students were on spring break. These counts reflect average traffic conditions when school is not in session. These counts were compared to traffic counts obtained for this project when school was in session to assess whether or not the assignment of existing school trips used in the transportation technical report is reasonable. The difference between the two counts should not necessarily be assumed to be due solely to school-related trips, since there are many factors that account for traffic volumes on any given day. Although the comparison cannot provide proof of school-related trip generation, it can provide a general reflection of traffic volumes near the school with and without the school in session.

Table 3-11 shows the daily, AM peak hour, school PM peak hour, and commuter PM peak hour volumes with and without school in session at three locations—4th Avenue North, north of Queen Anne Drive; Newell Street, west of 3rd Avenue North; and 3rd Avenue North, north of Newell Street. The first column of the table shows the traffic count location and the second and third columns indicate the traffic volumes with and without school in session. The fourth column shows the change in the traffic volume between columns 2 and 3. The fifth column indicates the estimated number of school trips that were assigned to that specific location. The

sixth column shows the difference between the change in traffic volumes (column 4) and the estimated school trips (column 5) at each location.

The total change in traffic volumes at the three count locations was less than the total school trip estimates for all conditions, except for the commuter PM peak hour. For example, the daily change in volume at the three locations totaled 646 vehicles, but the analysis included in this report assumed a total of 801 existing school trips at these locations. The traffic assignment during the commuter PM peak hour was nearly identical to the difference between the spring break and non-spring break counts.

Table 3-11. Comparison of Traffic Volumes With and Without School in session

Location	Traffic Volume		Change in Volume	Estimated School Trips	Difference
	School in session	School on spring break			
Daily Volumes					
4th Avenue, north of Queen Anne Drive	1,443	1,153	290	508	218
Newell Street, west of 3rd Avenue	551	401	150	91	-59
3rd Avenue, north of Newell Street	619	413	206	202	-4
Total	2,613	1,967	646	801	155
AM Peak Hour Volumes					
4th Avenue, north of Queen Anne Drive	229 [a]	78	151	221	70
Newell Street, west of 3rd Avenue	98	29	69	37	-32
3rd Avenue, north of Newell Street	95	24	71	74	3
Total	422	131	291	332	41
School PM Peak Hour Volumes					
4th Avenue, north of Queen Anne Drive	152[a]	65	87	163	76
Newell Street, west of 3rd Avenue	82	25	57	38	-19
3rd Avenue, north of Newell Street	76	28	48	61	13
Total	310	118	192	262	70
Commuter PM Peak Hour Volumes					
4th Avenue, north of Queen Anne Drive	135	106	29	29	0
Newell Street, west of 3rd Avenue	45	38	7	5	-2
3rd Avenue, north of Newell Street	59	43	16	13	-3
Total	239	187	52	47	-5

Source: Trafficount, Inc. Counts with SCDS in session were performed on February 3, 4, and 5, 2004. Counts with SCDS on Spring Break were performed on April 13, 14, and 15, 2004.

[a] Traffic volume based on actual count. Corresponding traffic volumes on Figures 9 and 10 are slightly higher to reflect balanced volumes between SCDS and the queen Anne Drive/4th Avenue North/Raye Street intersection.

Although the total existing school trips at the three count locations were higher than the total change in traffic volumes, the number of school trips assigned to 4th Avenue North was consistently higher than the change in traffic volumes at that location for all time periods, and the number of school trips assigned to Newell Street was consistently lower than the change in traffic volumes at that location. The number of school trips assigned to 3rd Avenue North was very similar to the change in traffic volumes at that location for all time periods. This information could suggest that the number of existing school trips assumed to be using 4th Avenue North may be higher than actual, and the number of existing school trips assigned to Newell Street may be lower than actual. If this is true, then the number of existing school trips currently traveling through the neighborhood on Newell Street and Warren Avenue North may be higher than presented in this report. If the difference between the two traffic counts was assumed to be due solely to the school, then about 60 additional school trips could currently be traveling on Newell Street (west of 3rd Avenue North) and Warren Avenue North over the course of a day. About 32 of those trips could be traveling in the AM peak hour and about 19 of those trips could be traveling in the school PM peak hour. The number of school trips traveling on this route during the commuter PM peak hour would be essentially the same as described in this report.

It should be noted that assigning a higher number of school trips to Newell Street rather than 4th Avenue North would not change any conclusions in this report. It could increase the percentage of school trips on Newell Street, but the percentage of school trips would not be higher than the percentage of trips on 4th or 3rd Avenues North. Also, the school is proposing to add a new private access drive that would be accessible from both the north and south on 4th Avenue North with the project. This improvement is expected to shift some drivers that currently circulate through the neighborhood to access the end of the queue back to 4th Avenue North. If there are more school trips currently circulating through the neighborhood, the proposed access drive could shift more existing trips than previously expected, thus creating a larger net reduction in trips on Newell Street.

Traffic Operations

The quality of traffic flow is defined by level of service (LOS). Levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delay. The City of Seattle considers LOS D to be acceptable for roadways in the City. The existing traffic operating conditions in the study area were analyzed using the methodologies in the *Highway Capacity Manual 2000* (Transportation Research Board Special Report 209, 2000).

The two intersections analyzed—Nickerson Street/3rd Avenue North/Florentia Street and Queen Anne Drive/4th Avenue North/Raye Street—currently operate at LOS C. The Queen Anne Drive/4th Avenue North/Raye Street intersection may operate with more delay than predicted. The LOS model limits the number of legs for an all-way stop intersection to four and likely underestimates the delay at the seven-leg intersection. In addition, most traffic going through the intersection is concentrated on just three of the seven legs, which results in increased delays. Some approaches to this intersection may operate over capacity at LOS F. Appendix C contains additional level of service information.

Drop-off and Pick-up Operations

The school's existing drop-off and pick-up area is located on 4th Avenue North in front of the school's main entrance. The area consists of a loop that can accommodate approximately seven vehicles at one time. The school day starts at 7:30 a.m. for the extended-day program, 8:15 a.m. for students in grades 6 through 8, and 8:30 a.m. for students in grades K through 5. During a field observation performed on June 12, 2003, some drivers were observed arriving at the school prior to 8:00 a.m. Most of these drivers appeared to be teachers and staff or parents with students in the extended-day program. Most parents were observed dropping off students between 8:00 and 8:30 a.m.

Parents arrive from the south on 4th Avenue North, from the west on Newell Street, and from the north on Nob Hill Avenue, 3rd Avenue North, and 4th Avenue North. Based on survey results, parents arrive about equally from the north and south, with a higher percentage (60 percent) leaving the site to the south on 4th Avenue North. This is consistent with field observations. Based on counts performed at the site driveways, about 55 percent of parents use the drop-off loop on 4th Avenue North in the morning. Most parents using the loop on 4th Avenue North to drop off their children arrive from the north and turn right directly into the loop. Some parents arriving from the south turn left into the loop. However, when the loop is full, parents proceed north on 4th Avenue North, turn around at the end of the street, and queue southbound on 4th Avenue North to wait to access the loop. On the observation day in June 2003, the peak morning queue occurred at 8:15 a.m. and again at 8:25 a.m. and consisted of about 12 vehicles (seven vehicles in the drop-off loop and five vehicles on 4th Avenue North). This queue extended north to about the school's northernmost driveway. The morning queue on 4th Avenue North dissipated by 8:30 a.m.

About 45 percent of parents park on the street and walk their children to school in the morning. Because parking is allowed on both sides of the roadway on Nob Hill Avenue, Newell Street, and 4th Avenue North, the roadways are effectively reduced to a single travel lane when heavily parked, which causes congestion. On the observation day in June 2003, congestion that involved vehicles having to wait while other vehicles traversed these streets occurred between about 8:00 and 8:30 a.m.

The school day at Seattle Country Day School ends at 2:50 p.m. for K through 3 students and at 3:10 p.m. for students in grades 4 through 8. During a field observation performed in March 2003, parents were observed arriving at the school to pick up their children around 2:30 p.m. Similar to the morning, parents were observed arriving from the south on 4th Avenue North, from the west on Newell Street, and from the north on Nob Hill Avenue. Based on survey results, about 45 percent of parents arrive from the south, with the remaining 55 percent arriving from the north and west. Based on counts performed at the site driveways, about half of parents use the pick-up loop on 4th Avenue North in the afternoon. This is consistent with field observations. During afternoon pick up, drivers are supposed to enter the pick-up loop from the north only. This causes some parents to circulate through the neighborhood to get in queue from the north.

The peak afternoon queue on the March 2003 observation day occurred at 2:50 p.m. for the first student release and totaled 20 queued vehicles—seven on site, 11 vehicles to the north on 4th Avenue North, and two vehicles to the west on Newell Street. By 3:05 p.m., the overall peak afternoon queue of 30 vehicles was observed (seven vehicles on site, 11 vehicles to the north on 4th Avenue, and 12 vehicles to the west on Newell Street). The queue on Newell Street extended west past Nob Hill Avenue. Because there were parked vehicles on both sides on Newell Street, the queue occurred in the single travel lane, which blocked the roadway for approximately 15 minutes, until about 3:20 p.m. By 3:30 p.m., the queue had reduced to about 14 vehicles (seven vehicles on site and seven vehicles on 4th Avenue North). The on-street queue dissipated by about 3:35 p.m.

Since the March 2003 observation, the south side of Newell Street adjacent to the two houses closest to 4th Avenue North has been signed for no parking between 2:00 and 4:00 p.m. This change was instituted to allow vehicles to queue on the south side of the roadway and leave the travel lane open for vehicles traveling on Newell Street. During an observation in February 2004, it was noted that drivers were using this space for afternoon queuing as desired. School-related vehicles contributed to congestion along this section of Newell Street; however, Newell Street was not observed to be blocked as it was in March 2003 during the afternoon pick-up time period.

3.4.1.4 Site Access

Seattle Country Day School has four access driveways located on 4th Avenue North. The southernmost driveway serves a parking lot with 15 parking spaces, the two center driveways serve the drop-off/pick-up loop and 10 parking spaces, and the northernmost driveway serves a small parking lot with four spaces behind the existing middle school building. All other access to the site occurs via sidewalks and stairways from the surrounding roadways. Pedestrian access occurs from both 4th and Nob Hill Avenues North.

3.4.1.5 Parking

The school has three on-site parking lots: one four-space lot north of the middle school building, one 10-space lot east of the lower school which includes a drop-off and pick-up area, and one with 15 spaces southeast of the lower school (See figure 2-1a). Of the 29 on-site spaces, 26 are for general use by faculty, staff, and visitors; one parking space in the drop-off/pick-up lot is designated for a small school bus; and two spaces are restricted to handicapped-accessible vehicles. Faculty and staff park either on site in one of the school's parking lots, in on-street parking spaces near the school, or in the gravel lot north of the condominiums located across 4th Avenue North. This gravel lot provides overflow parking for the condominium and is informally used by some faculty and staff.

School Parking Demand and Supply

The school's peak parking demand during an average school day includes vehicles parked by faculty, staff, and visitors. According to school administrators, the school has approximately 30 visitors per day with about five visitors at any one time. Based on information provided in the transportation survey, the peak parking demand at the school on an average weekday is approximately 57 vehicles.

As described previously, the school has 29 on-site parking spaces, of which 26 are available for faculty, staff, and visitor parking. Therefore, about 46 percent of the school's existing peak parking demand on an average day can be accommodated on site. The remaining 31 school-related vehicles typically park on street near the site.

On-Street Parking Demand and Supply

Parking demand is also generated by local residents. Many residents whose homes face Newell Street have off-street parking in driveways, garages, or both. However, residents throughout the surrounding neighborhood may also choose to park on street for convenience. To document the current level of on-street parking activity in the area surrounding the school, an on-street parking utilization study was performed. The on-street parking utilization was determined based on methodology described in the City of Seattle's Client Assistance Memorandum (CAM) #117 and considers parking within a 400-foot walking distance of the subject property. Barriers such as major arterials and geographic features are taken into consideration in defining the parking study area. The methodology for determining parking supply is further described in the *Transportation Technical Report* (Appendix C).

The study determined that there are a total of 100 on-street parking spaces within the study area during the noon and evening periods. One parking space is removed during the mid-afternoon period because parking is not permitted on the south side of Newell Street adjacent to 4th Avenue North.

On-street parking demand was surveyed within the study area for three weekday time periods—at noon, at 3:00 p.m. (mid-afternoon), and at 7:30 p.m. (evening). The noon time period represents a time when most school teachers, staff, and visitors are on site. The mid-afternoon time represents the peak parking demand when parents pick up students from school. The evening period represents the typical parking demand in the neighborhood when residents have returned home from work.

Parking surveys were conducted on Wednesday, March 5, 2003 and Thursday, March 6, 2003. The numbers of vehicles parked for each time period and survey day are summarized in Table 3-12.

Table 3-12. 2003 On-Street Parking Demand Survey Results

Time Period Surveyed	Parking Supply	Total Number of Vehicles Parked	Percent Utilization
Weekday, Noon			
Wed., March 5, 2003	100	42	42%
Thurs., March 6, 2003	100	51	51%
Average Weekday	100	*47*	*47%*
Weekday, 3:00 PM			
Wed., March 5, 2003	99	71	72%
Thurs., March 6, 2003	99	85	86%
Average Weekday	*99*	*78*	*79%*
Weekday, 7:30 PM			
Wed., March 5, 2003	100	46	46%
Thurs., March 6, 2003	100	44	44%
Average Weekday	100	*45*	*45%*

Source: Heffron Transportation Inc., 2004

On-street parking utilization was calculated using the methodology described in CAM #117 and is shown in Table 3-13. Parking utilization is the average number of on-street parked vehicles divided by the number of legal on-street parking spaces within the study area. As described above, the legal on-street parking supply within the study area is 100 spaces during the noon and evening time periods, and 99 spaces in the mid-afternoon time period.

As expected, the highest on-street parking utilization in the vicinity of the school occurs during the mid-afternoon when parents arrive to pick up students. It should be noted that, although the overall study-area parking utilization averaged 79 percent, parking utilization along streets closest to the school was much higher. In some cases, parking demand along segments of these roadways exceeded the legal supply. For example, utilization for on-street parking along the south side of Newell Street was 200 percent during the mid-afternoon time period, which indicates that many vehicles were parked illegally such as too close to driveways or in restricted areas. However, parking demand along several of the roadways within the study area, such as 3rd Avenue North, was well below the legal supply.

3.4.1.6 Charter Bus Operations

Charter buses are used to pick up and drop off students at the school for special off-site events and field trips. Bus pick up and drop off does not occur on site because the turning radius of the existing drop-off/pick-up loop is too small. Currently, buses typically stage in the eastbound travel lane on Newell Street or on Nob Hill Avenue North. Because of the narrow roadways, the charter buses can cause congestion or block travel on Newell Street and/or Nob Hill Avenue North while staging, loading, and unloading. According to school staff, buses are currently chartered about 40 times per school year, or about four times per month.

3.4.1.7 Delivery Operations

There are approximately five deliveries per day at the school—one food delivery and four other general deliveries such as mail or office supplies. The food delivery occurs on Nob Hill Avenue North, and includes the truck backing southbound on Nob Hill Avenue North to deliver food to the school's kitchen. The other deliveries typically occur at the school's drop-off/pick-up loop in front of the school. No increase in deliveries is anticipated in 2006 or 2010 with or without the project.

3.4.1.8 Special Events

Seattle Country Day School has approximately 35 special events each year with attendance ranging from about 12 persons for storytelling to about 400 persons for an annual chess match. The school hosts approximately 14 special evening/weekend events throughout the year that draw over 100 persons. These events are described in more detail in Section 1.2.

Because these events are typically held in the evenings, on weekends, or during the summer, they generally do not add to the school's peak hour traffic volumes or peak parking demand. Assuming an average vehicle occupancy rate of 2 persons per vehicle, the special events currently generate a peak parking demand in the range of 60 to 200 vehicles depending on the size of the event. There are currently 26 general-purpose parking spaces available on site and about 55 on-street parking spaces available in the evening (see Table 3-14). Therefore, parking generated by the larger events likely utilizes most parking spaces within the study area and extends farther into the surrounding neighborhood. These larger school events occur less than once per month.

The school hosts one special event each year that occurs during a school day—Grandparent's/Special Friend Day. The date of this event varies from year to year and lasts approximately two hours in the morning or afternoon. About 250 people attend and most drive themselves to and from the event. Because this event occurs on a school day, the parking generated by this event is in addition to the typical parking demand on an average day. According to school staff, this annual event generates the most parked vehicles of the school year, and school-related vehicles encompass all available parking in the study area and extend into the surrounding neighborhood.

The school also hosts interscholastic middle school basketball games in late November through early February and again in early March through mid-April. Up to 10 games occur on each Saturday and up to eight games on each Sunday. There are an estimated 50 attendees at each game in the November to February session and 30 attendees at each game in the March to April session. Attendees arrive in personal vehicles and park on-site and in available on-street parking spaces.

3.4.1.9 Safety

Traffic accident data were obtained from the City of Seattle for the school's main travel routes including:

- 4th Avenue North, between Queen Anne Drive and Newell Street
- Newell Street, between Warren and 4th Avenues North
- 3rd Avenue North, between Nickerson and Newell Streets
- Warren Avenue North, between Queen Anne Drive and Newell Street

The accident data included the period between January 1, 2000, and December 31, 2002. Signalized intersections with 10 or more accidents per year and unsignalized intersections with five or more accidents per year are considered high-accident locations by the City of Seattle. Accidents are infrequent in the area (see Table 14 in Appendix C). None of the study area intersections met or exceeded the City's high-accident threshold during any of the three years evaluated.

There were a total of two accidents involving bicyclists and one involving a pedestrian. All three accidents occurred at the Nickerson Street/Florentia Street/3rd Avenue N intersection—two blocks north of the school.

3.4.2 Operation Impacts

3.4.2.1 Alternative 1 – Preferred Alternative

Future traffic volumes were analyzed for 2006 and 2010. The year 2006 is the expected opening year for Phase 1 of the new school. Although the timing for Phase 2 development has not been finalized, it is assumed that Phase 2 could be completed and occupied in 2010.

School Trips

In 2006 without the proposed project, the number of trips generated by the school could increase due to a planned reorganization of the middle school, which could add up to 23 students and five faculty or staff. This proposed reorganization is explained in Section 1.2. This increase, which could occur without the proposed project, could raise student enrollment to 328 and faculty or staff to 61. According to school staff, no additional student enrollment or faculty or staff increases are planned by 2010. Therefore, the trip generation for 2006 and 2010 with and without the project would be the same and is based on an enrollment of 328 with 61 faculty or staff. Table 3-13 summarizes the estimated trip generation.

Table 3-13. Future (2006 and 2010) Seattle Country Day School Trip Generation Estimates

Trip Type	Daily Trips [a]	AM Peak Hour Trips (7:30 to 8:30 A.M.)			School PM Peak Hour Trips (2:30 to 3:30 P.M.)			PM Peak Hour Trips (5:00 to 6:00 P.M.)		
		In	Out	Total	In	Out	Total	In	Out	Total
Faculty or Staff	126	44	0	44	2	3	5	1	35	36
Parents	808	196	196	392	170	168	338	10	10	20
Shuttle Bus	10	0	0	0	1	0	1	0	0	0
Visitors/Deliveries [b]	70	0	0	0	0	0	0	0	0	0
Total	1,014	240	196	436	173	171	344	11	45	56

Source: Heffron Transportation Inc., 2004

a. Two trips were assumed for each SOV, HOV, and visitor (one trip to the site and one trip from the site), and four trips were assumed for each drop-off/pick-up vehicle (two trips in morning/two in afternoon). Faculty or staff were assumed to make 12 additional trips per day for meetings or off-site errands. Based on information gathered from SCDS, approximately 1.5 students are dropped-off or picked-up per vehicle.

b. Thirty visitors were assumed on an average day for a total of 60 trips. No visitor trips were assumed to occur during the peak hours. Five deliveries were assumed on an average day including mail, Federal Express, UPS, and two others (such as food, office supplies, cleaning supplies, or recycling); each delivery accounts for two trips (one entering and one exiting).

Five on-site single-family houses owned by the school would be demolished with the project. Four of those homes are currently rented and generate trips that are not related to the school. With the removal of the houses, the overall on-site trip generation would decrease by about 40 daily trips (three occurring in the AM peak hour and none in the school PM peak hour).

The school's trip assignment could shift with the proposed private access drive. The new drive would provide more on-site space for queuing and would be accessible from both the north and south on 4th Avenue North with northbound left turns into the site allowed. This improvement could shift some drivers that currently circulate through the neighborhood to access the end of the queue back to 4th Avenue North. This could reduce some school-related trips on Queen Anne Drive west of 4th Avenue North, on Warren Avenue North between Queen Anne Drive and Newell Street, and on Newell Street between Warren Avenue North and 4th Avenue North.

Because Seattle Country Day School has a history of increasing student enrollment, a sensitivity analysis was performed to determine potential transportation impacts if student enrollment did increase beyond 328 students. This analysis is presented in Section 3.14 of the transportation report (Appendix C).

Traffic Operations

Because the student enrollment and faculty or staff are not expected to increase in the future with the proposed project (beyond the planned reorganization), the LOS would be the same with or without the project. The Nickerson Street/3rd Avenue North/Florentia Street intersection is

predicted to decline to LOS D in the AM peak hour and remain at LOS C for the PM peak hour. The Queen Anne Drive/4th Avenue North/Raye Street intersection is expected to remain at LOS C in 2006, but decline to LOS D in 2010 during both the AM and PM peak hour. LOS D is considered acceptable by the City of Seattle.

Drop-off and Pick-up Operations

With the proposed project, drop off and pick up would be routed to a new private drive that would connect 4th Avenue North and Nob Hill Avenue North (See Figures 2-1 and 2-2). The drive would be approximately 230 feet long and would connect to a turn-around at the south end of Nob Hill Avenue. The proposed drop-off and pick-up area would be located on the south side of the new drive near the east end. Parents would enter the drive on 4th Avenue North (from the north and south), proceed west to the turn-around, and drive around to the east to the drop-off/pick-up area (see Figure 3-6). Because parents could queue on the north and south sides of the new drive and through the turn-around, the new drive is expected to accommodate approximately 29 vehicles at one time. This would more than quadruple the existing on-site queuing space and would reduce the number of school-related vehicles queued on the adjacent streets on an average school day. The existing peak afternoon queue was observed to be about 30 vehicles as described in Drop-off and Pick-up Operations in Section 3.4.1.3. Without the project, the queue could grow to about 37 vehicles (seven on site and 30 on street) in the future. The peak queue is not expected to increase with the proposed project, since no additional increases in student enrollment and faculty or staff are proposed with the project.

Based on this information, the peak on-street queue in the future with the project could be about eight vehicles—a reduction of about 22 vehicles queued on street at one time—assuming the school continues to load one vehicle at a time. If the school began loading more than one vehicle at a time, the peak queue could be reduced. No adverse traffic circulation or roadway impacts are expected due to the new drive, and pick-up and drop-off conditions are anticipated to be enhanced.

Site Access

The school's four access driveways on 4th Avenue North would be reduced to three with the preferred alternative. The two southernmost driveways would be removed with the construction of the new middle school building. The inbound center driveway would remain and would provide access to seven surface parking spaces. The existing northernmost driveway would also remain and would provide access to the new private access drive and drop-off/pick-up area. The new access drive would also provide access to parking spaces located along the access drive and at the west side of the school with Phase 1, and to structured parking with Phase 2. This access is proposed to be coned off on Nob Hill Avenue North during morning drop-off and afternoon pick-up periods in order to limit such activities to the new private drive's access on 4th Avenue North. A new access driveway would be located further to the north on 4th Avenue North and would provide access to 14 surface parking spaces.

Parking

The Preferred Alternative would increase the school's on-site parking supply from 29 spaces to 54 spaces with Phase 1 (50 general-use parking spaces, three handicapped-accessible spaces, and one bus space) and to 60 spaces with Phase 2 (56 general-use parking spaces, three handicapped-accessible spaces, and one bus space). The school's average daily peak parking demand is estimated to be 62 vehicles in the future with the planned enrollment reorganization. Since no additional faculty or staff and student enrollment increases are expected with the project, no increase to the average-day parking demand is anticipated. Based on the planned increase in on-site parking, the number of school-related vehicles parking on street is expected to decrease with the project. Based on the number of existing on-site general-use parking spaces, approximately 36 school-related vehicles are expected to park on-street during the noon and mid-afternoon time periods in the future without the proposed redevelopment project. With the project, the number of vehicles parked on-street is expected to be reduced to about 12 vehicles with Phase 1 and to about six vehicles with Phase 2 during these time periods based on the planned increase in general-use, on-site parking. Utilization during the evening peak is not likely to change since that is related to residential use in the area.

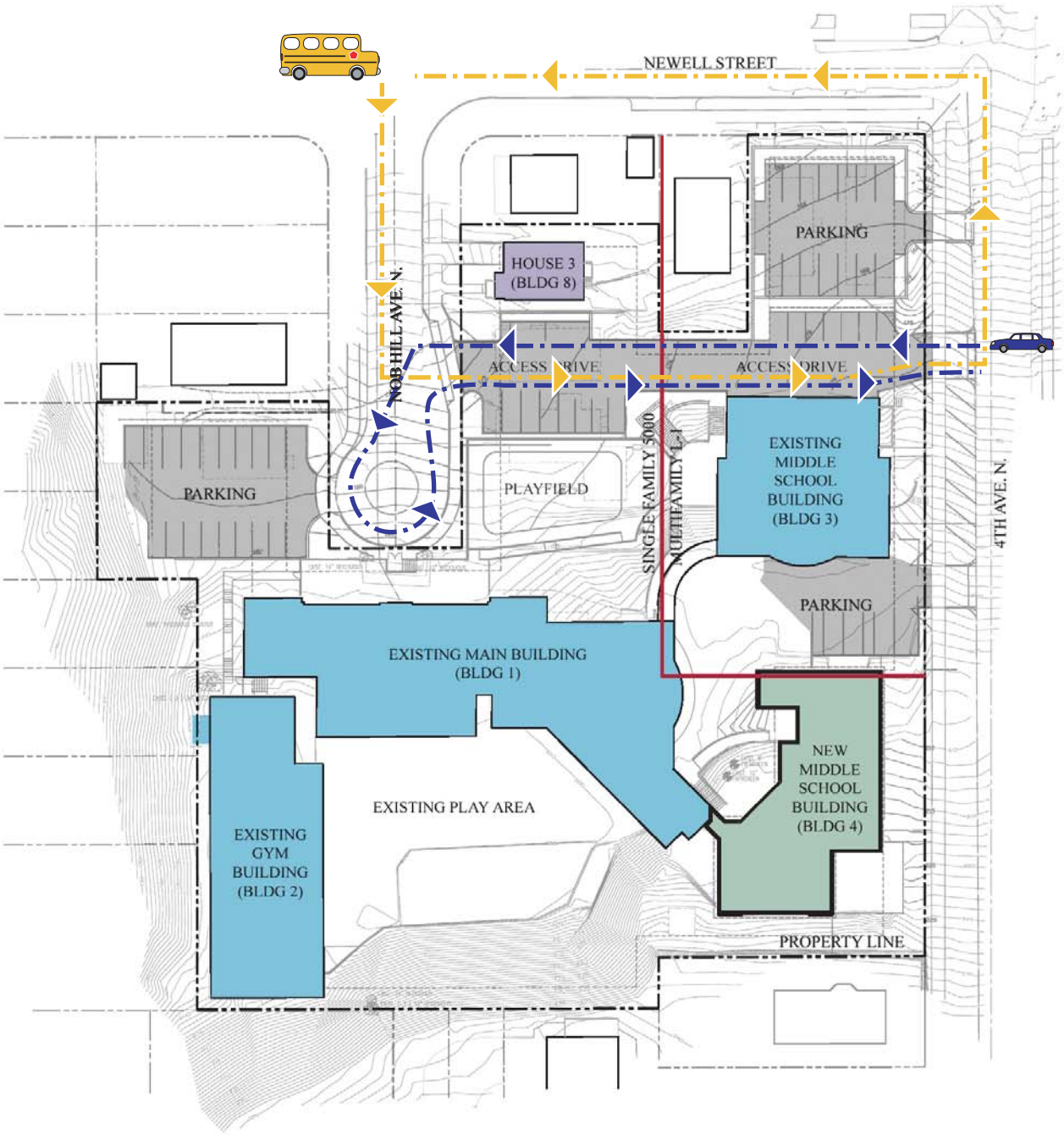
The project would reduce the number of curb cuts on 4th Avenue N from four to three, but would add a driveway on Nob Hill Avenue N. Since the total number of curb cuts would remain the same, the number of on-street parking spaces is not expected to change in the future with the project. Because the Preferred Alternative would increase the number of on-site parking spaces, and on-street parking supply in the site vicinity is expected to remain the same, the project is anticipated to improve parking conditions in the study area for typical everyday conditions.

Charter Bus Operations

With the preferred alternative, charter buses would use the new private access drive to stage, load, and unload students on the school site. Buses would likely enter the new drive from Nob Hill Avenue North, proceed to the east on the private access drive, load and/or unload students, and exit the site to the north on 4th Avenue North (see Figure 3-6). This improvement would remove the need for buses to stage on Newell Street and Nob Hill Avenue North and to block existing travel lanes.

Delivery Options

With the Preferred Alternative, all delivery trucks would access the site via the new private access drive. Truck drivers are expected to enter the new drive from 4th Avenue North, proceed west on the private access drive to deliver their goods, and then small trucks could turn around and exit the site to the east via 4th Avenue North. Larger trucks may exit the site via Nob Hill Avenue North. The new access drive would eliminate the need for trucks to back southbound on Nob Hill Avenue North on a daily basis.



NORTH (no scale)

File name: bus_routes.ai
Original graphics by: JAB
Additional graphics by:
Date: 05/18/04

SOURCE:
Carlson Architects

FIGURE 3-6.

CHARTER BUS AND PASSENGER VEHICLE CIRCULATION ROUTES
SEATTLE COUNTRY DAY SCHOOL EXPANSION, DRAFT EIS
SEATTLE, WASHINGTON

Event Conditions

Spectator events at Seattle Country Day School with the preferred alternative would be similar to those that currently occur on site. According to school staff, the sizes of special events with the project are expected to remain essentially the same in the future. Because a new "multi-purpose" space would be constructed, it is anticipated that up to three additional events could be held on site each year. The "multi-purpose" space is planned to seat about 120 persons. Assuming an average vehicle occupancy rate of two persons per vehicle, an event in the new space could generate about 60 parked vehicles. Approximately 90 percent of this parking demand could be accommodated on site with the increased parking provided in Phase 1 and 100 percent with Phase 2.

The additional on-site parking is expected to reduce the on-street parking associated with existing special events. Approximately 24 additional vehicles would be able to park on site in general-use stalls in Phase 1 and up to 30 additional vehicles with Phase 2. This would serve to reduce the overall on-street parking utilization during school events. Therefore, no significant adverse impacts to on-street parking are anticipated due to special events at Seattle Country Day School with the project.

Safety

The preferred alternative would reduce the total number of access driveways on 4th Avenue North from four to three. This reduction in driveways would reduce traffic and pedestrian conflicts along 4th Avenue North and improve overall safety conditions. The improved traffic flow during school drop-off and pick-up times may also enhance safety in the area by reducing U-turns that now occur as parents maneuver to get into the queue.

The Preferred Alternative would also add a driveway on the south end of Nob Hill Avenue North, which would provide vehicle access to the school. However, this driveway is planned to be coned off during the peak morning drop-off and afternoon pick-up time periods when school traffic volumes are highest. Since the driveway would only be open during low-volume time periods associated with the school, no safety concerns are expected due to the proposed driveway on Nob Hill Avenue North.

The new private access drive is expected to improve safety conditions on Newell Street and Nob Hill Avenue North. With the new access drive, buses would no longer need to stage on Newell Street and Nob Hill Avenue North and block existing travel lanes, and trucks would no longer need to back southbound on Nob Hill Avenue North to deliver food to the kitchen.

3.4.2.2 Alternative 2 – Reduced Lot Coverage

Alternative 2 is similar to the preferred alternative; however, an additional house would be demolished so a lot coverage variance would not be required. Because the house would be used by SCDS in Phase 1, the total site trip generation is expected to be the same as described for Alternative 1. Therefore, the impacts for Alternative 2 would be the same as described for the preferred alternative.

3.4.2.3 Alternative 3 – No Action

Alternative 3 would result in no changes to the school. No additional off-street parking would be provided and no new pick-up/drop-off facilities would be constructed.

3.4.3 Cumulative Impacts

Other road construction projects in the vicinity could exacerbate traffic congestion in the Seattle Country Day School neighborhood. One such project is the Fremont Bridge reconstruction scheduled to begin in 2005. During construction, the bridge would be reduced to one lane in each direction. This is expected to divert vehicles to alternative routes. Some vehicles may travel through the area near Seattle Country Day School to avoid the construction area. The Washington State Department of Transportation (WSDOT) has recommended improvements to the Queen Anne Drive/4th Avenue North/Raye Street intersection, but currently the City of Seattle has no specific plans for the intersection. Construction at the intersection could temporarily increase traffic congestion in the neighborhood, but could provide long-term improvements in traffic movement.

In addition to proposed construction projects, increases in traffic volumes can be anticipated as population continues to increase in the region. The increased background traffic would add to traffic congestion surrounding the school.

3.4.4 Operation Mitigation

The proposed action alternatives are not expected to result in significant adverse impacts. However, mitigation measures, such as the access drive with increased space for queuing and increased on-site parking, have been incorporated into the project alternatives. In addition, other options to improve overall transportation and parking conditions in the site vicinity could be implemented, including:

- Upon Seattle Department of Transportation approval, implement a coning plan for the turn-around on Nob Hill Avenue North to limit access for pick-up and drop-off activities on the new private drive to 4th Avenue North.
- Continue to work with neighbors in forums like the current Seattle Country Day School transportation advisory committee to address operational issues related to student drop-off and pick-up activities, parking, and special events.
- Prepare and implement an Operations Plan that could include surveys, observations, interviews, enforcement, or other measures to ensure that transportation operations (such as student drop-off and pick-up activities, on-street parking, and school-related queuing) function effectively with the proposal.

3.4.5 Significant Unavoidable Adverse Impacts

It is anticipated that existing traffic and parking conditions would be improved as a result of the project. However, some traffic impacts associated with an institutional use in a residential area will remain.

3.5 Construction Impacts

The following section summarizes impacts that are anticipated during Phase 1 and Phase 2 construction at the Seattle Country Day School project site. Phase 1 would occur from June 2005 to August 2006. Phase 2 construction has not been scheduled, but could start in June 2009. There would be three to four years between construction periods. The construction duration is estimated at 14 months each for both Phases 1 and 2. Construction impacts related to earth, land use, aesthetics, and transportation are discussed. In addition, this section discusses potential construction impacts associated with air quality and public utilities.

3.5.1 Earth

Earth resources generally include sensitive environmental features (e.g., steep slopes, landslide-prone and erosion hazard areas), soils, and groundwater. Construction-related activities including site clearing, grading, and demolition could potentially impact earth resources.

3.5.1.1 Alternative 1 – Preferred Alternative

Construction of the proposed project would require the demolition and removal of an existing paved parking lot, five residential homes, a detached garage, and a small school-owned greenhouse. With site clearing and grading, soils would be exposed by construction activities within the area of excavation and adjacent areas. As soils are exposed there is a potential for soil erosion, particularly along the steep slope areas. Construction activities would occur on portions of the steep slopes characterized as ECA's by the City of Seattle. Design of the facilities in steep slope areas are required to adhere to development standards established in Chapter 25.09 of the SMC.

Buildout of Phases 1 and 2 under Alternative 1 would require clearing and grading of approximately 88,800 square feet for buildings and parking. Approximately 6,500 cubic yards (cy) of excavation would be required for Phase 1 and 1,650 cy for Phase 2, for a total of approximately 8,150 cy of excavation. Construction would take place over approximately 14 months each for Phases 1 and 2. Construction of Phase I would be completed by 2006, while Phase 2 would be completed in 2010 if started in 2009.

Clearing and grading for Phase 1 construction would cover approximately 62,800 square feet. This includes the areas occupied by the five houses that would be demolished. Phase 2 construction would use approximately 18,000 square feet of the site that includes 6,000 square feet for the building footprint, 6,000 square feet for the parking garage, 4,000 square feet for the playfield, and 2,000 square feet for other construction areas.

At the topographically low areas of the site, filling of up to 5 feet may be required for the new parking lot and access drive in the northeast portion of the site (AMEC, 2004). On-site filling will utilize as much of the soils generated by excavation as possible. Filling activities not utilizing on-site material will import fill from a local gravel pit.

Excavation would range between 12 to 15 feet in depth to accommodate the proposed below-grade portions of the new middle school building and underground utilities such as waterlines,

storm drains, sewer pipes, manholes, and catch basins. Soils that would be encountered include fill soils consisting of loose sand layered with varying amounts of silt. These soils can be readily excavated using conventional earthwork equipment (e.g., tracked excavators, backhoes, dozers, etc.); however, the underlying very dense or hard soils may require larger excavators equipped with specialized cutting teeth, and or dozers equipped with attachments to loosen the soil (Lockard, personal communication, 2004).

During Phase 1 construction, minor grading would be required for construction of the new middle school building and west parking area (Figure 2-1b). However, more significant grading would be required for construction of the though-access drive, the north parking area, and the play area adjacent to Nob Hill Avenue North. These areas would require retaining walls up to 4 feet in cut and 12 feet in fill (Carlson Architects, 2003). Phase 1 grading plans require cutting as deep as approximately 5 feet in the northwest portion of the site for the new parking lot and up to 10 feet in the central portion of the site for the proposed parking lot and roadway. These cuts are expected to encounter fill soils consisting of loose, fine to medium sand layered with medium dense sand and some gravel (AMEC, 2004).

The most significant grade differential occurs adjacent to the proposed access drive, which would require the use of a retaining wall. The most significant temporary shoring for the building foundation would be required on the south end of the new middle school building due to its proximity to a steep slope. Shoring would be minimized by a cut slope (3/4:1 to 11/2:1 range) that is intended to excavate the building foundation to a daylight condition without extending excavation and soil reinforcement outside the property boundary (Carlson Architects, 2003). A temporary soil nailed wall or a drilled piling and lagged wall would be used as the shoring system during Phase 1 and 2 construction. The temporary shoring activities would last approximately four weeks at the beginning of each construction phase.

The presence of groundwater would require dewatering at the project site. Dewatering would be treated onsite and released to the sanitary sewer system. The contractor would dewater the project site during June and July, when the local sanitary sewer system is not at capacity.

3.5.1.2 Alternative 2 – Reduced Lot Coverage

Construction impacts would be similar to those described under Phase 1 for Alternative 1.

Phase 2 would require the removal of an additional house along Nob Hill Avenue North, resulting in the additional cut and fill of approximately 20 cubic yards and approximately 5,000 square feet of clearing and grading.

3.5.1.3 Alternative 3 – No Action

No construction impacts would occur with the selection of the No Action Alternative.

3.5.1.4 Mitigation

The on-site soils are generally characterized as moisture-sensitive and would be easily disturbed when wet; therefore it is recommended the contractor install appropriate temporary drainage systems at the construction site and minimize traffic over exposed subgrades. Earthwork should be scheduled during summer and fall months, when drier weather would maximize the potential for reusing on-site soils (AMEC, 2004). With the implementation of proper design and construction practices intended to protect the natural topography, the proposed development is not expected to adversely impact the existing slope stability during construction or at the completion of the project (AMEC, 2004). However, AMEC recommends that structures constructed near the steep slope on the west side of the project site be set back a minimum of 10 feet from the slope break.

Earth movement and excavation activities would be conducted in accordance with the City of Seattle's clearing and grading requirements. Temporary erosion and sedimentation control measures would be implemented during all phases of construction. Measures would be employed at the site boundaries to minimize the potential for off-site sediment transport. A combination of best management practices (BMPs) would be used to mitigate potential impacts generated by erosion of exposed soil to downstream storm drainage systems and would be described in a site-specific erosion and sedimentation control plan developed for all phases of construction. These BMPs would include, but not be limited to the following:

- A temporary erosion and sedimentation control (TESC) plan would be prepared and adhered to during construction.
- Exposed soils and stockpiled materials would be covered.
- Catch basins would be protected through the use of filter fabric or straw bales.
- Temporary construction access points would be stabilized with quarry spall to minimize the tracking of sediment onto public roads.
- Silt fencing, mulching, hydro seeding, jute matt, and/or plastic covering would be used to protect exposed steep slopes and stockpiled materials.
- Temporary interceptor swales, pipes, and collection sumps would be used.
- A geotechnical specialist would be retained on-site during construction activities to ensure stable conditions are maintained.
- To minimize impacts from dust, water would be sprayed over excavated soils and roadways would be swept on a regular basis.
- Soils would be exposed only in the active construction area.
- Following construction, the area would be promptly revegetated and landscaped.
- Baker tanks, used to settle sediments from dewatering prior to discharge to the stormwater system, may be used for water treatment of suspended soils (Carlson Architects, 2003).

3.5.2 Land Use

Construction impacts associated with land use generally relate to temporary impacts to surrounding land uses. Examples of impacts to land use include the location of construction vehicle parking and how it would affect the surrounding area and short-term dust, noise, and odor impacts that may be detected from a construction site.

3.5.2.1 Alternative 1 – Preferred Alternative

Most of the site development would occur during Phase I when 1,384 square feet of academic space would be demolished and a new 20,726 square foot middle school would be constructed. Site work during Phase 2 would entail demolition of 12,956 square feet of academic space and construction of a 26,253 square foot administrative/classroom building. The Phase 2 site work, with the exception of relocating the playfield, would be limited to the area surrounding the new administration/classroom building.

Staging areas for construction would be established on existing or new surface parking lots on the northern portion of the site and would likely be located between the Phase 1 and 2 buildings. Construction vehicles would access the site from 4th Avenue North, and construction-related traffic to and from the site would include large trucks and earth moving equipment. Construction workers would park off-site outside the neighborhood and arrive at the site via shuttle buses or vans when school is in session. When school is not in session, workers would park on-site. See Section 3.5.4 for a discussion of transportation impacts during construction.

3.5.2.2 Alternative 2 – Reduced Lot Coverage

Under Alternative 2, an additional residential structure would be demolished to meet SMC requirements for lot coverage. Construction impacts associated with buildout of Phases 1 and 2 under Alternative 2 would be the same as those discussed under Alternative 1.

3.5.2.3 Alternative 3 – No Action

Under the No Action alternative, no construction would occur on the project site, resulting in no impact to surrounding land uses.

3.5.2.4 Mitigation

Mitigation measures that would be implemented to minimize construction-related impacts on surrounding land use are discussed under earth, aesthetics, and transportation in this section.

3.5.3 Aesthetics

Construction-related impacts associated with aesthetic resources can generally encompass issues including light and glare, compatibility of the proposed structures with the surrounding neighborhood, and noise.

3.5.3.1 Alternative 1 – Preferred Alternative

Light and Glare

During the construction phase of the proposed project, no significant light and glare impacts are anticipated related to construction activities. Construction would mostly occur during daylight hours. Minimal temporary lighting would be required during winter months prior to sunrise.

Modifications to Building Bulk and Scale

The greatest impact to surrounding properties relates to the size of the new buildings, which would occupy a total of 77,000 square feet upon completion of Phases 1 and 2. Currently the school buildings occupy 43,032 square feet.

Five single-family residential properties and a garage would be removed from the project site where a parking lot, open space playfield, and access drive would be constructed. The buildings that would be removed are labeled Houses 1, 2, 4, 5, 6, and 6A in Figure 2-1a. During Phase 1 construction, demolition of the five residential properties and garage would commence in the summer of 2005 and would modify the school property when viewed by adjacent residences east, north, and south of the site, and the two homes adjacent to the proposed new access drive. As depicted in Figure 3-3, as Phase 1 construction proceeds, residences near the northwest corner of the school property would experience the most significant change to existing conditions relating to the bulk and scale of the school as two houses are removed and changed into a 14-stall parking lot. In addition, the three properties along the west side of Nob Hill Avenue North, south of Newell Street, would notice a change across the road as two houses are removed and a paved access drive and artificial turf playfield surrounded by a running track-type surface are installed. The southern-most house on the west side of Nob Hill Avenue North would be located adjacent to a 19-stall parking lot with the removal of the residence. Residents southeast of the school would see the construction of a new middle school building as the existing parking lot is removed (Figure 2-1a).

During the interim period between construction phases, the school site would have all the facilities shown on Figures 2-1b, 3.2 and 3.3. The interim period is planned to last from August 2006 to June 2009.

With Phase 2 construction, two changes would occur that would alter the appearance of the school facility. The largest change would be associated with the construction of the new classroom and administration building on the east side of campus. Although the new building would be constructed, the appearance of the school would not dramatically change with the construction of Phase 2 facilities since a three story building currently exists at this location (Figure 3-1). The other change would occur with the installation of a new playfield on the western portion of the property that would require the removal of the parking lot constructed during Phase 1. The playfield constructed during Phase 1 would be replaced by a section of the new classroom and administration building (Figure 2-2).

Noise

Noise and vibration would be associated with construction of the proposed school facilities and could temporarily impact surrounding single- and multi-family properties near the project area. These impacts would be expected to last for the duration of the approximate 14-month construction period. Construction would generally occur between 7:00 a.m. and 5:00 p.m. on weekdays; no construction would occur on weekends or holidays.

Construction equipment and vehicles including jackhammers, track hoes, dump trucks, forklifts, and boom trucks would be used during the demolition and construction phases of the project. Construction vehicles are anticipated to be used during the first three months of both proposed construction phases. This includes the use of dump trucks that would be used for four weeks during each phase; asphalt trucks would be required intermittently throughout construction phases. Most of the construction would be lower-intensity as interior work is completed after the initial demolition and use of heavy machinery. Table 3-14 lists a range of sound levels (dBA) for construction equipment that could be used at various times during construction at Seattle Country Day School.

Table 3-14. Anticipated Construction Equipment and Maximum Noise Levels

Type of Equipment	Rating or Capacity	Engine Size (Horsepower)	Range of Maximum Sound Level at 50 feet (dBA)
Hydraulic backhoe excavator	1-1/2 to 3 cu yd	131 to 335	82 to 86
	3-1/4 to 7 cu yd	336 to 760	86 to 90
Grader	9 to 16 ft blade	60 to 350	79 to 86
Mobile crane / boom truck	11 to 75 ton at 10 ft boom	121 to 240	82 to 85
Trucks	100 to 400 hp	100 to 400	81 to 87

Source: Bolt, Beranek, and Newman, Inc. (1981)

3.5.3.2 Alternative 2 – Reduced Lot Coverage

Light and Glare

Construction impacts relating to light and glare would be similar to those described for Alternative 1.

Modifications to Building Bulk and Scale

Construction impacts during Phase 1 construction would be similar to those discussed for Alternative 1.

During Phase 2 construction, the house at 2632 Nob Hill Avenue North would be demolished. This property is located directly adjacent to a single-family home at the corner of Nob Hill

Avenue North and Newell Street. The view to the north and west of this property would be altered from a house to a playfield on the adjacent lot.

Noise

Noise impacts during construction would be similar to those discussed for Alternative 1.

3.5.3.3 Alternative 3 – No Action

Construction is not proposed with this alternative; therefore, there would be no construction noise impacts.

3.5.3.4 Mitigation

Light and Glare

No major impacts related to light and glare are anticipated during construction. All temporary lighting would face toward the project site and surrounding properties would be shielded from glare.

Modifications to Building Bulk and Scale

No mitigation is required to reduce the impact of bulk and scale during construction. Design elements intended to reduce the impacts of the new facility's bulk and scale are described in the mitigation section of the land use section, 3.2.3, and the aesthetics section, 3.3.4.

Noise

Construction during Phases 1 and 2 at Seattle Country Day School would comply with Seattle Noise Ordinance requirements. Construction would generally occur between 7:00 a.m. and 5:00 p.m. Monday through Friday; no construction activities would occur on weekends or holidays.

Contractors would be required to comply with the Seattle Noise Ordinance that establishes maximum permissible sound levels for construction activities and equipment (SMC 25.08.425). If construction activities exceed permitted noise levels, the contractor would be required to implement measures to reduce noise impacts to comply with the Noise Ordinance. These measures may include additional muffling of equipment or erecting a temporary sound-absorbing fence between the construction equipment and receiving properties.

3.5.4 Transportation

The major concern regarding construction impacts to transportation deals with how many large vehicles would be required during construction and the routes these vehicles would take. Section 3.4 summarizes existing traffic conditions and the following text addresses proposed construction impacts to traffic. Appendix C details transportation issues at the Seattle Country Day School site.

3.5.4.1 Alternative 1 – Preferred Alternative

The construction-related traffic impacts of Alternative 1 would vary throughout the construction process. Most construction activity and related impacts would occur within the project site boundaries. However, some activities would require use of the local roadways and intersections surrounding the site.

Information provided by a contractor familiar with this type of construction indicates that approximately 545 dump truck loads would be required during Phase 1 based on cut and fill estimates, and about 140 dump truck loads during Phase 2. Because the adjacent roadways are narrow, only solo dump trucks are anticipated to be used at this site. Solo dump trucks carry approximately 12 cubic yards of material.

The heaviest construction impacts are expected to occur in a two-month period during excavation. Most of the dump truck loads are expected to occur in a four-week period for each phase. An estimated 100 to 150 additional trucks would be required to bring in asphalt and concrete during paving of the new parking lots and the new access drive. These truck trips would be required intermittently throughout the project.

Assuming the 545 truck loads occur over a four-week period (approximately 20 working days) for Phase 1 and 140 truck trips for Phase 2, the effort would require an average of approximately 16 truck loads per day for Phase 1 and 10 truck loads per day for Phase 2. Each truck load would generate two trips (one inbound and one outbound). Assuming transportation occurs over eight hours each workday, the excavation efforts would generate an average of about four truck trips per hour during Phase 1 and less than three truck trips per hour during Phase 2. Truck volumes would be about the same during paving elements of the project. Truck load information is summarized in Table 3-15.

Table 3-15. Estimated Truck Traffic Associated with Excavation.

	Truck Loads	Truck Loads/Day[a]	Truck Trips/Hour[b]
Phase 1	545	27	7
Phase 2	140	7	2

[a] Assumes most truck traffic would occur in a 4-week period.
[b] Assumes an 8-hour work day with truck trips spread evenly

The construction of the project would also require employees and equipment that would generate traffic to and from the site. Based on information provided by the contractor, construction at the site could occur from 7:00 a.m. to 5:00 p.m. Monday through Friday. It is anticipated that construction workers would arrive at the construction site before the AM peak traffic period on local area streets. Construction workers could add to the PM peak period if the shift ends at 5:00 p.m. The number of workers at the project site at any one time would vary depending upon the nature and construction phase of the project. Current estimates indicate the average number of construction employees on site during the first three months of each phase would be

approximately 30. After the earthwork and foundations are complete, the number could peak to about 60 employees during some phases such as finish work.

Based on these estimates, the proposed project would likely generate a noticeable amount of construction traffic on surrounding roadways. Trucks carrying material from the site would be most noticeable. According to the contractor, trucks are anticipated to use 4th Avenue North to access the site. Most trucks would be coming from and going to Aurora Avenue or Dexter Avenue via 6th Avenue North. Although the truck traffic would be noticeable, the increase would represent about 2 percent of overall midday traffic volumes on 4th Avenue North. The truck traffic is not expected to degrade operations of study area intersections during off-peak hours, and impacts during peak hours are expected to be reduced since construction traffic is typically reduced during these times.

The presence of a temporary construction work force could also increase the demand for study area parking. Construction workers are expected to park on site during the summer, but would park off site when school is in session. As described above, construction workers could peak at 60 employees. Assuming each worker drives alone to the site, approximately 60 additional vehicles would be generated that would need to park. Because on-street parking is limited and is likely to become more limited in the future when construction occurs, construction workers should not be allowed to park on street in the site vicinity on weekdays when school is in session. The contractor should secure available off-site parking and shuttle employees to the site. Potential off-site parking locations could include a local business or church that has excess parking during daytime hours.

Construction of Phase 2 is expected to cause some on-site parking to be temporarily unavailable. This condition would likely occur for one school year during Phase 2 construction. The school plans to secure off-site parking spaces to replace those that would be temporarily unavailable and have staff park at the off-site parking location. If the off-site parking is located too far away for staff to walk to school, the school would provide a shuttle between the off-site parking location and the school.

3.5.4.2 Alternative 2 – Reduced Lot Coverage

Construction impacts for Alternative 2 would be similar to those for the preferred alternative. As part of Phase 2 an additional single-family home would be demolished, resulting in slightly increased truck traffic.

3.5.4.3 Alternative 3 – No Action

No traffic-related construction impacts would occur with the selection of the No Action Alternative.

3.5.4.4 Mitigation

A construction management plan (CMP) addressing traffic and pedestrian control would be prepared to address truck routes, lane closures, and sidewalk closures. To the extent possible,

the CMP should direct trucks away from local access streets to avoid unnecessary conflicts with residents and pedestrians. In addition, off-site parking would be secured for construction workers if construction occurs on weekdays when school is in session.

The school would secure off-site parking for staff during Phase 2 construction to replace on-site parking that would be temporarily unavailable. If the off-site parking is located too far away for staff to walk to school, the school should provide a shuttle between the off-site parking location and the school.

3.5.5 Air Quality

Typical air-related construction impacts include fugitive dust from earth moving activities and construction traffic and odors that may be detected from the project site. Potential impacts related to air quality that could occur at the school project site are described below.

3.5.5.1 Alternative 1 – Preferred Alternative

Temporary, construction-related emissions are anticipated from trucks and construction equipment. Fugitive dust may arise from excavation, demolition, vehicle traffic, human activity, and wind erosion over exposed earth surfaces. Some construction phases would cause odors detectable to some people near the project site, especially during paving operations that use tar and asphalt. Such odors would be short-term.

3.5.5.2 Alternative 2 – Reduced Lot Coverage

Construction impacts to air quality would be similar to those described under Alternative 1. Demolition of an additional residence would increase the potential for fugitive dust.

3.5.5.3 Alternative 3 – No Action

No construction impacts to air quality would occur with the selection of the No Action Alternative.

3.5.5.4 Mitigation

Contractors would be required to use known, available, and reasonable measures to control construction-related emissions to meet Puget Sound Clean Air Agency (PSCAA) requirements as further defined in the City of Seattle's Best Management Practices (BMPs) guidelines to reduce surface and air movement of dust during grading, demolition, and construction activities. Measures to reduce adverse short-term impacts to air quality may include watering dirt driveways and construction surfaces to control dust. Upon completion of grading, contractors may also use temporary ground covers, sprinkle-approved dust palliatives, or use temporary stabilization practices. Construction vehicle traffic would be limited to a minimum. Construction would be planned to minimize exposing areas of earth for extended periods.

3.5.6 Public Services and Utilities

Impacts to utilities are generally related to disruptions to utility service that could occur if existing overhead and underground utilities are affected. Impacts to public services generally refer to the ability of emergency service providers (e.g., police, fire department, ambulance service) to maneuver unimpeded around the construction site.

3.5.6.1 Alternative 1 – Preferred Alternative

On-site underground utilities such as water and sewer could be affected by construction activities, depending on the depth of excavation. Overhead utility lines that extend throughout the perimeter of the site, including electricity and telephone lines, are not expected to be relocated during construction. Temporary disruptions to overhead utilities could occur as utility lines are connected to the new facilities. Utility disruptions would be short-term and temporary.

Construction would involve the use of heavy equipment and vehicles utilizing local roads that could subsequently result in temporary road detours and delays, especially to emergency service vehicles where lanes are closed and traffic is rerouted, particularly if room is not available for vehicles to move right to allow emergency vehicles to pass.

3.5.6.2 Alternative 2 – Reduced Lot Coverage

Construction impacts to public services and utilities would be similar to those discussed for Alternative 1.

3.5.6.3 Alternative 3 – No Action

No construction impacts to public services and utilities would occur with the selection of the No Action Alternative.

3.5.6.4 Mitigation

Utility providers would be consulted prior to excavation and other digging activities to ensure utility lines are unaffected during construction.

A construction management plan would be developed and would include measures to minimize traffic disruptions to emergency service providers.

3.5.7 Significant Unavoidable Adverse Impacts

Impacts associated with construction during the two phases of the project would be significant. These impacts would include dust, odor, noise, and traffic disruptions. These impacts are unavoidable, but would be temporary. The impacts would last approximately 14 months for each phase, but the most intense construction activity and related impacts would last for shorter periods.

CHAPTER 4.0 REFERENCES

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CHAPTER 5.0 DISTRIBUTION LIST

Metro Environmental Planning
201 S Jackson Street
MS KSC-TR-0431
Seattle WA 98104

Office of the Governor
Legislative Building
Olympia WA 98504

Urania Perez
Senior Environmental Specialist
Seattle Dept of Transportation SMT-39-00

Puget Sound Clean Air Agency
110 Union St - Suite 500
Seattle Wa 98101-2038

Puget Sound Regional Council Of Governments
1011 Western Ave #500
Seattle Wa 98104

United Indians Of All Tribes
P O Box 99100
Seattle Wa 98199

Washington State Dept Of Transportation
P O Box 330310
Seattle Wa 98133-9710

Dept Of Ecology (2)
Environmental Review Section
P O Box 47703
Olympia Wa 98504-7703

Dept Of Health
Office Of Program Services
P O Box 47820
Olympia Wa 98504-7820

Dept Of Community Development
State Historic Preservation Office
111 W 21st Ave Kl-11
Olympia Wa 98504-5411

Dept Of Natural Resources
Sepa Center
P O Box 47015
Olympia Wa 98504-7015

Economic Development Admin
U S Dept Of Commerce
915 2nd Ave - Rm 1856
Seattle Wa 98174

Environ. Protection Agency
Eis Coordinator
1200 6th Ave - Ms Eco-088
Seattle Wa 98101

Housing & Urban Development
Environ/Community Planning
909 1st Ave - Suite 200 (Ms Oad)
Seattle Wa 98104

League Of Women Voters
Land Use Chair
1402 18th Ave
Seattle Wa 98122

Allied Arts Of Seattle
105 S Main Street-Suite 200
Seattle Wa 98104

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P O Box 11050
Seattle Wa 98111

Seattle Times
Mark Watanabe
P O Box 70
Seattle Wa 98111

Seattle Post Intelligencer
101 Elliott Ave W
Seattle Wa 98119

National Marine Fisheries Svc
7600 Sand Point Wy Ne
Seattle Wa 98115-0070

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City Council
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Director (3)
Seattle Transportation
Smt-39-00

Law Dept
Ch-04-01

Lynn Sullivan
City Light
Smt-28-22

Director
Parks Dept
Pk-01-01

Chief
Police Dept
Jc-05-01

Director (3)
Dept Of Neighborhoods
Ar-04-02

Chief
Fire Department
FD-44-01

SEPA/PIC
20th Floor
DPD

Design Commission
19th Floor
DPD

Director
Health Department
FI-15-20

Seattle Pacific University Library
Suite 306
3226 Sixth Avenue West
Seattle, WA 98119

Elliott R. Ohannes, Chair
Mayfair Neighborhood Assn
2627 Nob Hill Avenue North
Seattle, WA 98101

Central Library
1000 4th Avenue
Seattle, WA 98104-1109

Fremont Branch
731 N. 35th Street
Seattle, WA 98103

Queen Anne Branch
400 W. Garfield
Seattle, WA 98119

Appendix A – Geotechnical Engineering Report

REVISED GEOTECHNICAL ENGINEERING REPORT
SEATTLE COUNTRY DAY SCHOOL
CLASSROOM BUILDING ADDITIONS
SEATTLE, WASHINGTON

Submitted to:

Seattle Country Day School
c/o
The Seneca Group, Inc.
1201 Third Avenue, Suite 2350
Seattle, Washington 98101

Submitted by:

AMEC Earth & Environmental, Inc.
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington 98034-6918

June 24, 2004

3-91M-14692-0

June 24, 2004
3-91M-14692-0

Seattle Country Day School
C/O The Seneca Group, Inc.
1201 Third Avenue, Suite 2350
Seattle, Washington 98101

Attention: Mr. Bob Wicklein

Subject: Revised Geotechnical Engineering Report
Seattle Country Day School
2619 Fourth Avenue North
Seattle, Washington

Dear Mr. Wicklein:

AMEC Earth & Environmental, Inc. (AMEC) is pleased to submit this revised report describing our geotechnical engineering evaluation for the above-referenced project. The purpose of our evaluation was to derive design conclusions and recommendations concerning site preparation, excavations, foundations, floors, drainage, retaining walls, shoring walls, roadway cuts and fills, pavement sections, and structural fill. AMEC previously completed a preliminary geotechnical evaluation of the project site and submitted a *Technical Memorandum* (3-91M-14692-0) dated May 22, 2003. We also provided our original Geotechnical Engineering Report, dated August 18, 2003, which now has been modified to reflect review comments provided by the City of Seattle Department of Planning and Development dated Jun 1, 2004.

As outlined in our proposal letter dated May 5, 2003, our scope of work comprised a field exploration, laboratory testing, geotechnical research, geotechnical analyses, and report preparation. We received your written authorization for our evaluation on May 8, 2003. This report has been prepared for the exclusive use of Seattle Country Day School, The Seneca Group, Inc. and their consultants, for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

AMEC Earth & Environmental, Inc.
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington
USA 98034
Tel (425) 820-4669
Fax (425) 821-3914
www.amec.com

We appreciate the opportunity to be of service on this project and would be happy to answer any questions you may have.

Sincerely,

AMEC Earth & Environmental, Inc.

William J. Lockard, L.E.G.
Senior Project Geologist

WJL/TDW/clt

Distribution: Mr. Bob Wicklein, The Seneca Group, Inc. (3)

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SEATTLE COUNTRY DAY SCHOOL
CLASSROOM BUILDING ADDITIONS
SEATTLE, WASHINGTON

1.0 SUMMARY

The following summary of project geotechnical considerations is presented for introductory purposes and, as such, should be used only in conjunction with the full text of this report.

- Project Description: Phase 1 improvement plans call for construction of a new three story over a basement 6th – 8th Grade school building at the southeast corner of the subject property. Additional improvements include, construction of paved parking lots in the central and northwest portions of the site, upgrades to the terminus of Nob Hill Avenue, and construction of a grass playfield at the northwest portion of the site. To accommodate the above mentioned improvements will require demolition of several single-family residences and removal of some school buildings and parking areas. Proposed Phase 2 improvements are to include replacement of the existing 4th – 5th Grade building with a new structure that will include one level of underground parking.

- Exploratory Methods: We explored subsurface conditions by means of ten borings advanced at strategic locations across the project site, to depths ranging from about 11 to 61½ feet below existing grades. Two of these borings, B-1 and B-2, were previously conducted by AMEC during our preliminary geotechnical evaluation of the site. We also reviewed the logs of seven subsurface explorations previously conducted by AMEC (formerly AGRA Earth & Environmental, Inc.)

- Soil Conditions: Soils underlying the site generally consist of thin discontinuous wedges of uncontrolled fill soil that mantled silty fine to medium sand varying to a fine to medium sand with trace to some silt. (USCS soil classifications SW – SM). Deeper deposits were found to consist of hard silt varying to sandy silt.

- Groundwater Conditions: At the time of drilling, groundwater was encountered within eight of our ten total borings. We encountered two generally distinct groundwater zones during our explorations. A perched groundwater layer was encountered within boring B-1 at a depth of 9½ feet (el. 190½ ft) and in boring B-3 at 11 feet (el.195 ft). Groundwater levels within the observation wells at the time of drilling were on the order of 20 to 21 feet. Subsequent groundwater measurements in late May and mid June, indicated the depth to groundwater increased to 23 to 26 feet within the approximate area of the proposed 6th – 8th Grade building. Groundwater levels across the remainder of the site varied from 3 feet to 30 feet.

- Slope Stability Analysis: Our analysis indicates that the steep slopes on the south and west sides of the site do not appear to be at a significant risk of a deep-seated failure. However, due to the steep slope inclinations and the presence of loose

surficial soils typically found on slopes, there is a moderate risk of near-surface slope failures that would incorporate the surficial soils and vegetation, resulting in a debris flow that is typical of the area. As such, it may be prudent to construct a parapet wall on the south side of the new 6th – 8th Grade Building. It is our opinion that the proposed development would not adversely impact the existing slope stability during construction or once completed, provided recommendations contained herein are adhered to during design, construction and use.

- Foundations: Conventional spread footings will provide adequate support for the 6th - 8th Grade building (Phase 1 work) and the proposed 4th - 5th Grade building (Phase 2). However, our recommendations are contingent on the finished floor elevations indicated on the SCDS Masterplan conceptual layout, and on the subgrade soils being properly prepared.

- Floors: Soil-supported slab-on-grade floors can be used in the proposed buildings if the subgrades are properly prepared.

- Shoring Walls: It is our opinion that either soldier pile walls or soil nail walls could be used for shoring excavation sidewalls for the 6th - 8th Grade building where lateral constraints preclude the use of temporary cut slopes. Temporary tiebacks or soil nails can extend into the City right-of-way if an easement is obtained from the City, but permanent anchors are generally not allowed. Shoring may also be required for the proposed 4th - 5th Grade building for the Phase 2 development

- Retaining Walls: In our opinion, conventional backfilled, cast-in-place concrete walls will adequately support the proposed cuts and fills. However, we also understand that MSE wall are also being considered. Regardless of the type of retaining wall utilized, these walls should be designed to withstand the appropriate lateral pressures.

- On-Site Soil Considerations: Because the on-site soils are moisture-sensitive and would be readily disturbed when wet, the contractor should install appropriate temporary drainage systems at the construction site and should minimize traffic over exposed subgrades. Ideally, earthwork would be scheduled for the summer and fall months, when drier weather will maximize the potential for reusing on-site soils and when groundwater levels will likely be at their seasonal low.

2.0 SITE AND PROJECT DESCRIPTION

The project site is an existing independent school located on the north slope of the Queen Anne Hill Neighborhood of Seattle, Washington, as shown on the enclosed *Location Map* (Figure 1). The school site consists of an irregularly shaped parcel that measures about 360 by 360 feet overall. Site boundaries are generally delineated by Newell Street on the north, by private residences on the south and west, by 4th Avenue North on the east. The enclosed *Site & Exploration Plan* (Figure 2) illustrates these site boundaries and adjacent existing features.

According to *SCDS Masterplan Initial Phase and Future Phase* layout drawings prepared by Carlson Architects, (undated), development plans call for development to be conducted in two phases. The initial phase of improvements is to consist of construction of a new 6th-8th Grade building at the southeast corner of the site within the existing parking lots. The remaining portions of the parking area would be converted to a courtyard area. The new 6th-8th Grade building would be a three-story building over a basement, portions of which would be below-grade. The structure is anticipated to be of steel-frame construction with cast-in-place concrete walls below grade and steel studs above grade. We anticipate that the structure would impose moderate foundation loads. Additional improvements proposed for the initial phase of the masterplan include demolition of the existing private residences along Nob Hill Avenue North and Newell Street for a new playfield and driveway areas located within the central portion of the site, north of the existing K-3rd Grade building and at the northeast corner of the subject site. A grass playfield may be built in the northwest portion of the site, requiring demolition of a residence located on the property, and construction of a retaining wall near the northwest corner of the existing K-3rd Grade building

Phase 2 development plans call for demolition and replacement of the existing 4th–5th Grade Building. The new 4th-5th Grade building will be located within the central portion of the site developed during the initial phase of work as a playfield. The new building would consist of a 3 - story building over one level of underground parking (basement). The building would extend westward from the east edge of the existing structure to the eastern edge of the K-3rd Grade building. The new building would be connected to both the existing K-3rd building and the Library building. We understand that the sub-basement level would be situated at an approximate elevation of 178 feet. We anticipate that the building walls and columns will impose moderate foundation loads. Site grading will consist of shoring installation and mass excavation for the proposed buildings and associated site improvements.

AMEC previously conducted two geotechnical evaluations for the subject site. The earliest study was performed for the Library building with the results presented within our *Subsurface Exploration and Geotechnical Engineering Study*, (W-4251) dated May 15,1984. Our second study was performed for an addition to the existing 4th-5th Grade building. Results for this study were presented in our *Subsurface Exploration and Geotechnical Engineering Evaluation* (W-4251-2) dated August 14, 1990.

The conclusions and recommendations contained in this report are based on our understanding of the currently proposed utilization of the project site, as derived from layout drawings, written information, and verbal information supplied to us. Consequently, if any changes are made in the

currently proposed project, we may need to modify our conclusions and recommendations contained herein to reflect those changes.

3.0 EXPLORATORY METHODS

We explored surface and subsurface conditions at the project site in two phases: a preliminary phase during May 2003, and a design phase during June 16 & 17, 2003. Our exploration and testing program comprised the following elements:

- A visual surface reconnaissance of the site;
- Ten borings (designated B-1 through B-10) with Standard Penetration Tests, advanced at strategic locations across the site;
- Two groundwater observation wells (designated MW-1 and MW-2), installed in strategically located boreholes;
- Six grain size analyses, performed on selected soil samples obtained from strategic locations beneath the site;
- Ten moisture content determinations, performed on selected soil samples obtained from strategic locations beneath the site;
- A review of published geologic and seismologic maps and literature.

Table 1 summarizes the approximate functional locations, surface elevations, and termination depths of all pertinent subsurface explorations, and Figure 2 their approximate relative locations. Appendix A of this report describes our field exploration procedures, and Appendix B describes our laboratory testing procedures.

TABLE 1
APPROXIMATE LOCATIONS, ELEVATIONS, AND DEPTHS OF EXPLORATIONS

Exploration	Functional Location	Surface Elevation (feet)	Termination Depth (feet)
B-1*	NW edge of main parking lot	200	61½
B-2*	SW edge of upper parking lot	217	41½
B-3	South edge of main parking lot	206	41½
B-4	Top of retained slope	229	21½
B-5	North edge of lower parking lot	175	25
B-6	Grass strip at edge of walkway	163	11
B-7	Top of retaining wall	173	21½
B-8	Grass at SW corner of house	179	21½
B-9	Asphalt playground	199	21½
B-10	Top crest of slope	186	39

Elevation datum: Topographic Survey, Chadwick & Winters Land Surveyors, 98-2160, February 13, 2003
* Includes observation well

The specific number, locations, and depths of our explorations were selected by AMEC in relation to the existing and proposed site features, under the constraints of surface access, underground utility conflicts, and budget considerations. We estimated the relative location of each exploration by measuring from existing features and scaling these measurements onto a layout plan supplied to us, then we estimated their elevations by interpolating between contour lines shown on this same plan. Consequently, the data listed in Table 1 and the locations depicted on Figure 3 should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

It should be realized that the explorations performed and utilized for this evaluation reveal subsurface conditions only at discrete locations across the project and that actual conditions in other locations could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

4.0 SITE CONDITIONS

The following sections of text present our observations, measurements, findings, and interpretations regarding development, surface, soil, groundwater, and seismic conditions at the project site.

4.1 Development Conditions

The subject site is currently occupied by the Seattle Country Day School facility, although several occupied, single-family residences on the north side of the property owned by the school lie within the proposed project area. The school facilities consist of four buildings that includes a gymnasium at the southwest corner of the property, a two-story library building, a two-story brick classroom building in the central portion of the site, and a two-story, wood-framed classroom building in the northeast portion of the property. Associated improvements include asphalt-paved parking and roadways in the southeast portion of the site, a paved play area within the south-central portion of the site, and numerous concrete sidewalks between the buildings.

4.2 Surface Conditions

The subject site is located on the north-facing slope of Queen Anne Hill, immediately above the Freemont area of Seattle. This area is characterized as a moderately to steeply north-facing slope that has been locally modified by development activities. Slope inclinations adjacent the subject site average approximately 20 percent along the paved roadways. The subject site consists of both moderate and steep slopes that in general slope down from south to north, separated by flat-lying terraces, with total topographic relief across the site of approximately 70 feet.

The steepest slopes are located on the south and west sides of the property. These areas are undeveloped and vegetated with both maple and fir trees and a moderate to heavy understory of blackberry vines and ferns. The southernmost area of the subject site slopes downward to the north from the property line at an approximate inclination of 1.5H:1V (Horizontal:Vertical) with approximately 30 feet of vertical relief. At the toe of the slope is an existing play area and school buildings. Along the western portion of the site exists a steep, west-facing slope that is inclined at approximately 1.5 to 1.75H:1V. The existing gymnasium and the westernmost portion of the main school building are situated at the top of this slope, with residences located at the base of the slope on the adjoining properties. Moderately inclined slopes are located at several locations around the campus, many of which are formed by man-made structures (rockeries, cast-in-place concrete walls, buildings, and gravity walls).

4.3 Soil Conditions

According to published geologic maps, soil conditions in the site vicinity are characterized by glacially derived soils deposited during the Vashon Glaciation 13,000-17,000 years ago. Our on-site explorations revealed somewhat variable near-surface soil conditions but confirmed the mapped stratigraphy. Table 2 summarizes the approximate thicknesses, depths, and elevations of selected

soil layers. The enclosed *Geologic Cross-Section* (Figure 3) illustrates our stratigraphic interpretations across the projected construction area in the east half of the site.

In general, our explorations encountered thin discontinuous wedges of fill soil (Hf) that had been placed behind retaining walls at borings B-4, B-5, B-6, and B-7 as well as thin layers of fill at borings B-8 and B-10. We encountered a large amount of fill soil under the existing middle parking lot that was as thick as 8 feet in boring B-1. This fill soil was interpreted as uncontrolled fill, presumably placed during a previous phase of development and likely gets thicker along the south side of the existing 4th & 5th grade school building and may be present under the north half of the upper parking lot as well. The fill soils under the main parking lot were very loose to loose, moist, fine to medium sand with trace gravel and scattered asphalt chunks. This fill soil mantled a discontinuous organic-rich silt that we estimated to be approximately 1-foot thick and was interpreted to represent a relic topsoil horizon (Hp). We encountered the relic soil in only one of our borings (B-1).

The relic topsoil in turn, mantled a medium dense to very dense, damp to saturated, gravelly sand interpreted as an advance glacial outwash deposit (Qva). This unit, also known as the Esperance Sand, was encountered at the surface in borings B-2 and B-4, which are located at higher elevations in the southeast corner of the site. The sand was 20-feet thick in boring B-2 located in the upper parking lot of the main parking lot and we believe that this unit thickens to the north, and pinches out completely to the south of the main parking lot.

The advanced glacial outwash mantles an advanced glaciolacustrine deposit (Qvgl) that is also known as the Lawton Clay. The glaciolacustrine deposit is characterized by medium dense/stiff to very dense/hard, moist to saturated, interbedded fine sand and silt that is thinly to thickly laminated. We encountered the glaciolacustrine unit in eight of our ten borings and believe that the glaciolacustrine deposit is present at depth under the entire school site. We encountered the glaciolacustrine unit near the surface in the southwest corner of the site where large cuts were made in the topography during construction of the existing gymnasium and playground area. Lower on the hill, at the northeast corner of the site we encountered a thin to moderately thick layer of medium dense to very dense, damp to wet, silty gravelly sand that we interpret to be weathered glacial till (Qvt). We encountered the glacial till at or near the surface in borings B-5, B-6, B-7 and B-8. The weathered till lies over the glaciolacustrine unit in this area. The elevation of the contact of the glaciolacustrine unit and the overlying soil layers ranges from 197 feet in boring B-2 in the southeast corner of the site, to 162 feet in boring B-5 in the northeast corner of the site. We believe that the contact slopes downward to the north across the school site.

TABLE 2
APPROXIMATE THICKNESSES, DEPTHS, AND ELEVATIONS OF SOIL LAYERS

Exploration	Thickness of Fill Soil (feet)	Thickness of Very-Loose to Loose Native Soil (feet)	Depth of Medium-Dense Native Soil (feet)	Elevation of Medium-Dense Native Soil (feet)
B-1	9	10	19	181
B-2	N/E	N\E	B/P	217
B-3	4	6	10	196
B-4	2	N/E	2	227
B-5	4	N/E	4	171
B-6	6	N/E	6	157
B-7	11½	N/E	11½	161½
B-8	2	N/E	2	177
B-9	4	N/E	4	195
B-10	2½	13½	16	170

Elevation datum: Topographic Survey, Chadwick & Winters Land Surveyors, 98-2160, February 13, 2003
N/E = not encountered within depth of exploration but likely present at greater depth.
G/S = exposed at ground surface.
B/P = encountered directly below the pavement.

Our geotechnical laboratory tests indicated that the glaciolacustrine soils (Qvgl) have a fines (silt and clay) content on the order of 79 to 94 percent, and moisture content on the order of 26 to 30 percent. We interpret these soils to be currently above their optimum moisture contents, and to be highly sensitive to moisture content variations. Our geotechnical laboratory tests revealed that the advanced glacial outwash soils (Qva) have a fines (silt and clay) content on the order of 8 percent, and moisture content on the order of 4 to 16 percent. We interpret these soils to be currently at or below their optimum moisture contents, and to be low to moderately sensitive to moisture content variations. Our geotechnical laboratory tests found that the glacial till (Qvt) have a fines (silt and clay) content on the order of 40 percent, and moisture content on the order of 8 to 23 percent. We interpret these soils to be currently at or above their optimum moisture contents, and to be highly sensitive to moisture content variations.

The enclosed laboratory testing sheets graphically present our test results, and Table 3 summarizes these results.

TABLE 3
LABORATORY TEST RESULTS

Soil Type - and Source/Designation	Sample Depth (feet)	Moisture Content (percent)	Gravel Content (percent)	Sand Content (percent)	Silt/Clay Content (percent)
SIEVE ANALYSIS					
Glaciolacustrine - B-1/S-3	13½	28.7	0	6.5	93.5
Glacial Outwash - B-2/S-1	3½	15.8	0.4	91.2	8.4
200 WASH					
Fill - B-1/S-1	3½	10.3	N/T		15.0
Weathered Glacial Till – B-8/S-1	2½	13.1	N/T		40.4
Glaciolacustrine - B-9/S-2	5	28.3	N/T		79.1
Glaciolacustrine - B-10/S-3	12½	30.0	N/T		94.2
MOISTURE					
Glacial Outwash – B-2/S-3	13½	4.0	N/T		
Glaciolacustrine - B-1/S-4	18½	28.9	N/T		
Fill - B-3/S-1	2½	10.6	N/T		
Glaciolacustrine - B-3/S-5	20	28.8	N/T		
Glacial Outwash – B-4/S-2	10	9.1	N/T		
Weathered Glacial Till – B-5/S-3	8½	8.1	N/T		
Weathered Glacial Till – B-6/S-3	7½	8.8	N/T		
Weathered Glacial Till – B-7/S-3	15	23.8	N/T		
Glaciolacustrine - B-8/S-3	10	27.9	N/T		
Glaciolacustrine - B-10/S-6	27½	26.2	N/T		

N/T = not tested

4.4 Groundwater Conditions

At the time of drilling groundwater was encountered within eight of our ten borings. We encountered two generally distinct groundwater zones during our explorations. We encountered a perched groundwater layer within boring B-1 at a depth of 9½ feet (el. 190½ ft) and in boring B-3 at 11 feet (el.195 ft). In both these borings, which were located at higher elevations in the east and southeast corner of the site, the perched groundwater was observed in the more permeable glacial outwash sand (Qva) and was perched atop the finer grained, an less permeable, glaciolacustrine deposits (Qvgl). The observed perched groundwater zones ranged in thickness from approximately 2½- to 6-feet thick. The lower groundwater zone we encountered was within the glaciolacustrine deposits at elevations that ranged from 152 feet at boring B-5 located in the lower parking lot at the southeast corner of the site, to el. 196 feet in boring B-9 located in existing playground in the northwest corner of the site. The glaciolacustrine soil was thinly to thickly laminated, fine sand and silt with the finer-grained layers being generally damp to moist and the coarser-grained layers being generally saturated. The alternating permeable (aquaclude) and less-permeable (aquatard) inter-layering of the glaciolacustrine deposit makes the groundwater regime within this soil unit somewhat complex.

Within boring B-10, we encountered both a perched groundwater layer and lower groundwater within the glaciolacustrine deposit at depths of 13½ and 30 feet respectively.

We installed two monitoring wells (OW-1 and OW-2 at borings B-1 and B-2, respectively) within the footprint of the proposed 6th-8th grade building. The wells were installed to intercept and monitor the deeper groundwater table, but not the perched groundwater table. On May 21, and June 20, 2003, groundwater readings were taken at both wells, with the results summarized within Table 3 below. Because our explorations were performed during an extended period of generally dry weather, the groundwater conditions present at that time may closely represent the yearly low to average levels. Somewhat lower levels probably occur during the late summer and early fall months, whereas higher levels probably occur during the winter and early spring months. Perched groundwater likely forms atop the glaciolacustrine horizon during periods of heavy rainfall. Throughout the year, groundwater levels would likely fluctuate in response to changing precipitation patterns, off-site construction activities, and site utilization.

TABLE 4
APPROXIMATE DEPTHS AND ELEVATIONS OF GROUNDWATER ENCOUNTERED IN EXPLORATIONS

Exploration	Observation Well	Depth of Perched Groundwater (feet)	Depth of Groundwater (feet)	Elevation of Groundwater (feet)	Date of Measurements
B-1	OW-1	9½	21½	178½	5/10/03 (ATD)
B-1	OW-1	9½	23	174	5/21/03
B-1	OW-1	9½	26	171	6/20/03
B-2	OW-2	N/E	20½	196½	5/10/03 (ATD)
B-2	OW-2	N/E	23	194	5/21/03
B-2	OW-2	N/E	23	194	6/20/03
B-3	N/W	11	20	186	6/16/03 (ATD)
B-4	N/W	N/E	N/E	N/E	6/17/03 (ATD)
B-5	N/W	N/E	23	152	6/17/03 (ATD)
B-6	N/W	N/E	N/E	N/E	6/17/03 (ATD)
B-7	N/W	N/E	12½	155½	6/16/03 (ATD)
B-8	N/W	N/E	15	164	6/16/03 (ATD)
B-9	N/W	N/E	3	196	6/16/03 (ATD)
B-10	N/W	13½	30	156	6/17/03 (ATD)

N/W = no well installed
N/E = not encountered within depth of exploration
ATD = at time of drilling

4.5 Seismic Conditions

Based on our analysis of subsurface exploration logs and our review of published geologic maps, we interpret the on-site soil conditions to correspond to seismic soil profile types S-C and C as

defined by Table 16-J of the 1997 *Uniform Building Code* and the 2000 *International Building Code*, respectively. Current (1996) *National Seismic Hazard Maps* prepared by the U.S. Geological Survey indicate that a peak bedrock site acceleration coefficient of about 0.33 is appropriate for an earthquake having a 10-percent probability of exceedance in 50 years (corresponding to a return interval of 475 years). According to Figure 16-2 of the 1997 *Uniform Building Code* the site lies within seismic risk zone 3.

5.0 SLOPE STABILITY EVALUATION

To address the issue of steep slopes located on and adjacent the subject site and the potential impact of the proposed improvements on the slopes, we performed a slope stability evaluation for these slopes. Our evaluation consisted of a visual slope reconnaissance, a historical review of readily available information for the site and immediate vicinity, and a slope stability analysis. These elements of our evaluation are discussed below.

5.1 Slope Reconnaissance

A visual reconnaissance of the steep slopes on the south and west sides of the property was performed during the course of our investigation to determine if there were visual indications of slope instability. Our reconnaissance of the slope areas adjacent the proposed 6^{th} – 8^{th} grade building and the playfield at the northwest corner of the site, did not disclose the presence of any recent slope movement. Typical indications of movement include (but are not limited to) leaning trees or bowed tree trunks, vertical or near-vertical scarps, and tension cracks. However, it should be noted that dense vegetation and steep slope inclinations along the west property line made the reconnaissance work difficult and may have concealed some evidence of past movement.

No evidence of slope movement or instability was noted along the south property line in the area adjacent the proposed 6^{th} – 8^{th} grade building. This area is extensively landscaped with a two-tier rockery, grass bench, established shrubs and associated landscaping.

5.2 Historical Review

As part of our evaluation, we reviewed the City of Seattle, Department of Land Use and Construction (DCLU) files for historical landslide activity within a 500-foot radius of the subject site. A total of three landslides were found within the search area that are summarized below:

- December 1933 – a landslide was reported near the intersection of Aurora Avenue and Haliday Street. This sliding involved a slumping failure toward the west, about 50 feet above the newly constructed Aurora Avenue.

- August 1975 – Heavy rains uprooted trees along the 2600 block of Third Avenue North, that was described by a City Engineer as minor, and that no deep-seated movement was observed.

- November 1978 – A clogged catch basin on Queen Anne Drive resulted in surface water being diverted down the steep slope north of Nob Hill Avenue, which subsequently eroded a block of soil estimated at approximately 5 to 20 cubic yards in volume. The soil was deposited at the base of the slope, immediately behind the main classroom building (now the K – 3^{rd} Grade building). According to observations made by the Engineering Department, there was no evidence of a deep-seated failure. The catch basin was subsequently replaced, and other drainage improvements were made.

Based upon our review of the historical records, it appears the typical failure mechanism along the slopes within the project area is a shallow, near-surface failure within the loose, colluvium mantling the more dense soils beneath.

5.3 Slope Stability Analysis

Based on our field observations and the proposed re-development plans, we identified the steep slope west of the proposed play field to be the most critical. In order to establish an appropriate setback from the slope for this area of the project site, we analyzed the slope stability under selected conditions at the cross-section location B – B' shown on Figure 2. The following sections describe our method of analysis and present our results.

5.3.1 Method of Analysis

Slope stability analyses typically involve five basic slope parameters: (1) location and shape of the potential failure surface, (2) internal friction angle of the various soils, (3) cohesion of the various soils, (4) density of the various soils, and (5) location of the piezometric groundwater surface. Unfortunately, few of these parameters are accurately known at the start of an analysis. Instead, these parameters usually must be estimated, interpreted, and/or assumed on the basis of visual observations, field testing, laboratory testing, empirical correlations, and experience with similar soil types.

Once all five parameters have been tentatively established, the critical slip surface and associated safety factor of a given slope can be calculated. A "critical slip surface" is defined as the most likely surface along which a soil mass will slide, and a "safety factor" is defined as the ratio of the sum of all moments resisting slope movement versus the sum of all moments tending to cause slope movement. Consequently, a slope that possesses a safety factor of 1.0 is on the verge of sliding, whereas a slope with a safety factor greater than 1.0 has some resistance to sliding. According to standard geotechnical engineering practice, a static safety factor of 1.50 and a seismic safety factor of 1.10 are considered the desirable values for engineered walls, but 1.25 and 1.01, respectively, are often regarded as acceptable values for slopes.

Slope stability conditions for the project site were analyzed by means of Bishop's Simplified Method of Slices, which utilizes a limit-equilibrium technique. All calculations were performed by means of the computer program SLOPE-W. This program utilizes topographic, soil, and groundwater information input by the user to determine the most critical slip surface.

Our estimated values of internal friction angle, cohesion, and density for each soil layer are listed in Table 5. The location of the slope section analyzed is shown on Figure 2. To model the foundation load applied by a potential retaining wall along the west property line, we applied a vertical force of 2,000 pounds per linear foot; this load acted at a depth of about 5 feet, where suitable bearing soils were encountered in our borings. We also elected to analyze the existing slope using a piezometric elevation of 173 feet, which would simulate the groundwater conditions at the time of our field explorations. By convention, seismic stability conditions are analyzed by applying a horizontal

acceleration equal to one-half of the appropriate peak ground acceleration. Based on a peak bedrock acceleration of 0.33g for the site, we utilized a design value of 0.17g.

TABLE 5
ESTIMATED PROPERTIES OF ON-SITE SOILS FOR STABILITY ANALYSIS

Soil Type	Density (pcf)	Cohesion (psf)	Internal Friction Angle (degrees)
Loose Silty SAND	110	0	32
Medium-Dense Silty SAND	120	0	34
Stiff Clayey SILT	100	500	26
Medium-Dense Silty SAND with some Gravel	120	0	35
Dense Gravelly Silty SAND	130	0	37
Glacial Till	140	500	38

5.3.2 Results of Analysis

Utilizing the aforementioned values of internal friction angle, cohesion, density, foundation load, and piezometric elevation, we calculated the safety factors associated with numerous slip surfaces for cross-section B-B'. We subsequently found that the minimum safety factor (excluding surficial failures as discussed below) corresponds with a circular slide plane that daylights near the toe of the slope at an approximate elevation of 160 feet as shown graphically on Figure 4. Next, we calculated the safety factors for imaginary sliding surfaces that pass through a 10-foot slope setback line with a footing load acting at the line. Our analyses yielded safety factors of 1.5 and 1.8, respectively, under static conditions, and safety factors of 1.0 and 1.2 under seismic conditions. Table 6 summarizes these analytical results. All of these safety factors meet or exceed the aforementioned minimum values.

TABLE 6
CALCULATED SAFETY FACTORS FOR SELECTED SLIDE CONDITIONS

Slide Condition	Sliding Mode	Static Safety Factor	Seismic Safety Factor
Critical	Circular	1.5	1.0
10-foot slope setback	Circular	1.8	1.2

However, based upon site conditions, and historic slope failures in the area, it is our opinion that for the steep slopes on the west side of the project site, a surficial failure that lies roughly parallel to the slope surface would have a lower factor of safety than shown in Table 6. This sliding mode

represents surficial raveling and slope stability modeling indicates that the soil becomes more slide-resistant with depth; that is, deep-seated slope movements are less likely.

5.4 Slope Mitigation

We recommend that a minimum 10-foot setback from the slope break be maintained for all proposed structures along the west side of the site. This will serve to minimize disturbance of the slope during construction and provide added protection for the proposed structures against surficial slope failures.

It is our opinion that it is not necessary to construct a catchment wall for the south side of the 6th – 8th grade building due to the stable nature of the landscaped area that lies between the south property line and the existing parking lot, and due to the relatively low topographic relief across this portion of the slope. However, we recommend that the south building wall be designed with a parapet at least 2 feet high in order to prevent any surface water runoff or raveling soils from negatively effecting the framed portion of the structure or any architectural finishing's on the outside of the south wall. We also recommend that a paved drainage gutter be constructed behind the walls to collect slope runoff water. Periodic inspection and maintenance by school maintenance personnel may be needed to keep the gutter clear of debris.

6.0 CONCLUSIONS AND RECOMMENDATIONS

We offer the following general geotechnical conclusions and recommendations concerning this project.

- Feasibility: Based on our field explorations, research, and analyses, construction of the proposed 6th-8th Grade building, and the associated parking lots and retaining wall for the Phase 1 site improvements appears feasible from a geotechnical standpoint. Additionally the Phase 2 replacement of the existing 4th–5th Grade Building within the central portion of the site, also appears feasible from a geotechnical standpoint. However, for both phases of work our opinions are contingent on the recommendations presented herein.

- Foundation Options: In our opinion, the proposed structures can be supported by conventional spread footings that bear on medium dense/very stiff native soils or properly placed and compacted structural fill placed over suitable native subgrade soils.

- Floor Options: Soil conditions are amenable to the use of a soil-supported slab-on-grade floor, contingent on proper subgrade preparation.

- Retaining Wall Options: In our opinion, conventional backfilled, cast-in-place concrete walls will adequately support the proposed cuts and fills. These walls should be designed to withstand appropriate lateral pressures. Shoring for the lower level of the 6th-8th Grade Building can be accomplished by soldier pile or soil nail walls.

- Steep Slope Setback: Due to the presence of a steep slope on the west side of the project site and our stability analysis performed for the slope, we would recommend that any structures be setback a minimum of 10 feet from the slope break.

- Liquefaction Considerations: "Liquefaction" is a sudden increase in porewater pressure and sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose sands with a silt content less than about 25 percent are most susceptible to liquefaction, whereas other soil types are generally considered to have a low susceptibility. Groundwater was measured at depths greater than 20 feet, in dense sands, well below any loose sands on the site. Because our explorations did not reveal any liquefaction-prone soils below the site, we interpret the risk of liquefaction to be negligible.

- Seismic Considerations: Based on our literature review and subsurface interpretations, we recommend that the project structural engineer use the following seismic parameters for design of buildings, retaining walls, and other site structures, as appropriate.

Design Parameter	Value
Acceleration Coefficient (1996 USGS)	0.33
Risk Zone (UBC)	3
Soil Profile Type (1997 UBC)	S-C
Soil Profile Type (2000 IBC)	C

- Risk Evaluation Statement: It is our opinion that the proposed development will not increase the risk of damage to the site or adjacent sites due to soil movement during the construction phase or upon completion of the project. We have based our opinion on our reconnaissance of the steep slopes on the west and south sides of the subject site, on the soil conditions disclosed by our explorations, and on our slope stability modeling. However, we assume that the conditions and recommendation contained within this report will be adhered to during design, construction and use.

- On-Site Soil Reuse: Our visual soil classifications and laboratory testing indicate that most of the on-site soils are moderately to highly moisture-sensitive and susceptible to disturbance when wet. In order to maximize the potential for reusing on-site soils as structural fill, earthwork should be scheduled for periods of dry weather, such as usually occur during the summer and early fall months.

- Subgrade Protection: Due to the moisture-sensitive nature of the on-site soils, the contractor should install appropriate temporary drainage systems to keep water out of the construction areas, and should minimize traffic over any subgrades prepared within these soils.

The following text sections of this report present our specific geotechnical conclusions and recommendations concerning site preparation, spread footings, slab-on-grade floors, drainage systems, backfilled walls, underground utilities, asphaltic pavements, and structural fill. ASTM specification codes cited herein refer to the current American Society for Testing and Materials manual. WSDOT specification codes and plan designations cited herein refer to WSDOT publications M41-10, *1998 Standard Specifications for Road, Bridge, and Municipal Construction*, and M21-01, *Standard Plans for Road, Bridge, and Municipal Construction*, respectively.

6.1 Site Preparation

Preparation of the project site will involve demolition, temporary drainage, clearing, stripping, cutting, filling, excavations, erosion control, and subgrade compaction. The paragraphs below discuss our geotechnical comments and recommendations concerning site preparation.

Demolition: The first step in site preparation will likely consist of demolishing portions of the existing parking areas, roadways and some of the existing structures. Any associated underground structural elements or utilities, such as old footings, stemwalls, and drainpipes, should be exhumed as part of this demolition operation.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Nonetheless, we anticipate that curbs, berms, or ditches placed around the work areas will adequately intercept surface water runoff.

Erosion Control Measures: With the initiation of site clearing and grading, soils will be exposed by construction activities within the excavation and adjacent areas. Once soils have been exposed there exists a potential for soil erosion, particularly on a sloping site, such as the subject site. To minimize erosion and off-site migration of sediment, Best Management Practices (BMP's) should be adhered to and the appropriate erosion control measures should be installed, maintained and inspected on a regular basis and after any major rainstorm event. During the design process careful project planning should occur to ensure that the areas disturbed by construction activities are minimized. For example, designing all temporary facilities to control runoff during clearing and grading, with any surface water runoff controlled by means of interceptor swales and collector pipes During the course of construction, temporary erosion-sediment control measures should be instituted including, but not limited to, the following:

- Silt fencing around the perimeter of the construction areas, with the base of the silt fence buried so that sediment cannot pass beneath it,
- Storm drain inlet protection,
- Designated stone-stabilized construction entrances.
- Disturbed areas stabilized by organic mulch materials, such as straw, wood chips, bark, and wood fiber mulching or netting
- Covering of bare areas that need immediate protection from erosion with clear plastic sheeting
- Covering any stockpiled soils with plastic sheeting

It may be prudent to maintain a berm and swale around the downslope side of stripped areas and stockpiles in order to capture runoff water and thereby reduce the downslope sediment transport. In addition, the stripped areas should be revegetated as soon as possible, also reducing the potential for erosion.

Clearing and Stripping: After surface and near-surface water sources have been controlled, the construction areas should be cleared and stripped of all trees, bushes, sod, topsoil, debris, asphalt, and concrete. Our explorations indicate that an average thickness of about 4 to 6 inches of sod and topsoil will be encountered across the site, but significant variations could exist. Furthermore, it should be realized that if the stripping operation proceeds during wet weather, a generally greater

stripping depth might be necessary to remove disturbed moisture-sensitive soils; therefore, stripping is best performed during a period of dry weather.

Site Cutting: Proposed Phase 1 grading plans call for cutting as deep as about 5 feet in the northwest portion of the site, to achieve design subgrades for the new parking lot. Additional cutting of up to 10 feet will occur in the central portion of the site for the proposed parking lot and roadway. Based on our explorations, we expect that these cuts will encounter fill soils consisting of loose, fine to medium sand that mantles medium dense sand with some gravel.

Site Excavations: We anticipate that excavations ranging up to about 12 to 15 feet deep will be required to accommodate the proposed below grade portions for the proposed 6th-8th Grade building as well as other underground utilities. Based on our explorations, we anticipate that these excavations will encounter fill soils consisting of loose sand that mantles native, medium dense to dense sand with varying amounts of silt. These soils can be readily excavated with conventional earthworking equipment, in our estimation, but extra effort will be needed to loosen the underlying glacially overridden silt (if encountered). Although our explorations did not reveal rubble within the fill soils or boulders within the native soils, such obstacles could be present at random locations within these deposits.

Dewatering: Our explorations encountered perched groundwater at 9 to 11 feet below existing grades at the southeast portion of the site. A deeper groundwater table was encountered within the same area at a depth of about 20 feet below grade at the time of drilling, but we expect that groundwater levels may rise several feet during the winter and spring. Consequently, site excavations might extend below the groundwater level, depending on the actual excavation depth and time of year. If groundwater is encountered, we anticipate that an internal system of ditches, sumpholes, and pumps will be adequate to temporarily dewater the excavation.

Temporary Cut Slopes: All temporary cut slopes associated with site regrading or excavations should be adequately inclined to prevent sloughing and collapse. For the various soil layers that will likely be exposed in on-site cuts, we tentatively recommend the following maximum cut slope inclinations. However, appropriate inclinations will ultimately depend on the actual soil and groundwater conditions exposed during earthwork.

Soil Type	Expected Depth Interval	Maximum Inclination
Loose SAND with some silt (Fill)	0 to 8 feet	1.5H:1V
Medium-Dense to Dense SAND	8 to 20 feet	1H:1V
Stiff to Hard SILT	4 to 40 feet	3/4H:1V
Glacial Till	2 to 17 feet	3/4H:1V

Subgrade Compaction: Exposed subgrades for footings, floors, pavements, and other structures should be compacted with a large vibratory roller to a firm, unyielding state. Any localized zones of loose granular soils observed within a subgrade should be compacted to a density commensurate

with the surrounding soils. In contrast, any organic, soft, or pumping soils observed within a subgrade should be overexcavated and replaced with a suitable structural fill material.

Site Filling: We anticipate that grading plans will call for filling as high as about 5 feet in the topographically low areas of the site, to achieve design subgrades for the new parking lot and roadway in the northeast portion of the site. Our conclusions regarding the reuse of on-site soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fill should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, all building pad and parking lot or roadway fill soil should be compacted to a uniform density of at least 90 percent (based on ASTM:D-1557), and the uppermost 2 feet of any fill placed below future asphaltic pavements should be compacted to at least 95 percent.

On-Site Soils: Because large cuts are planned for the project, we expect that large quantities of on-site soils will be generated during earthwork activities. As such, we offer the following evaluation of these on-site soils in relation to potential use as structural fill.

- *Surficial Organic Soils*: The sod, duff, topsoil, and organic-rich soils mantling portions of the site are *not* suitable for use as structural fill under any circumstances, due to their long-term compressibility. Consequently, these materials can be used only for non-structural purposes, such as in landscaping areas.

- *Uncontrolled Fill Soils*: The fill soils encountered in the immediate vicinity of the 4th-5th Grade building and on the north and west sides of the site appear suitable for reuse as structural fill at their present moisture contents. However, aeration or sprinkling might be needed to achieve an optimum moisture content during especially wet or dry conditions, respectively. Any debris or deleterious materials present in these soils would need to be segregated from the matrix.

- *Advance Outwash*: The fine to medium sands with varying silt content underlying parts of the site will provide a favorable source of fill soils and appear suitable for reuse as structural fill at their present moisture contents. However, the soils with higher fines contents will be difficult to reuse during wet weather, although they may become suitable for reuse during a period of dry weather if they can be aerated to reduce their moisture content. Aeration or sprinkling might be needed to achieve an optimum moisture content during especially wet or dry conditions, respectively. Any boulders or large cobbles present in these soils would need to be segregated from the matrix for certain fill applications.

- *Upper Silty Sands and Sandy Silts*: The silty sands and sandy silts underlying the advance outwash and/or glacial till to the east and directly beneath the fill in the south-central portion of the site do not appear suitable for reuse as structural fill at their present moisture contents. Additionally, these soils will be difficult or impossible to reuse during wet weather, due to their high silt contents.

- *Glacial Till*: The glacial till soils underlying the northern portion of the site appear marginally suitable for reuse as structural fill at their present moisture contents. However, these soils will be difficult or impossible to reuse during wet weather, due to their high silt contents, but may become suitable for reuse during a period of dry weather if they can be aerated to reduce their moisture content.

Wet-Weather Considerations: As discussed above, portions of the on-site soils would be difficult to reuse as structural fill during wet weather. Consequently, the project specifications should include provisions for using imported, clean, granular fill in case site filling must proceed during wet weather. For general structural fill purposes during wet weather, we recommend using a well-graded sand and gravel, such as "Gravel Backfill for Walls" per WSDOT: 9-03.12(2).

Permanent Slopes: All permanent cut slopes and fill slopes should be adequately inclined to minimize long-term raveling, sloughing, and erosion. We generally recommend that no slopes be steeper than 2H:1V. For all soil types, the use of flatter slopes (such as 3H:1V) would further reduce long-term erosion and facilitate revegetation.

Slope Protection: We recommend that a permanent berm, swale, or curb be constructed along the top edge of all permanent slopes to intercept surface flow. Also, a hardy vegetative groundcover should be established as soon as feasible, to further protect the slopes from runoff water erosion. Alternatively, permanent slopes could be armored with quarry spalls or a geosynthetic erosion mat.

6.2 Soldier Pile Walls

Temporary shoring walls should be constructed along any excavation sidewalls that cannot be adequately sloped or set back as previously described. We anticipate that shoring walls will be needed for construction of the 6th-8th Grade Building. In our opinion, a conventional shoring wall consisting of soldier piles, lagging, and possibly tiebacks would be suitable (but not necessarily economical) for this purpose. Such a shoring wall could also be designed as a permanent retaining wall and incorporated into the basement wall of the buildings, if desired. We offer the following design and construction recommendations concerning soldier piles, lagging, and tiebacks.

6.2.1 Soldier Piles

Applicability: In our opinion, soldier pile walls can be used in either a cantilevered or a tied-back configuration for shoring any of the proposed excavation sidewalls at the site.

Pile Embedment: All soldier piles should have sufficient embedment below the final excavation level to provide adequate "kick-out" resistance to horizontal loads. We recommend a minimum embedment of 10 feet below the excavation base, and any excavations located within about 10 horizontal feet of the pile. However, deeper embedments are usually needed to develop adequate passive resistance at specific locations, especially for cantilevered piles.

Drilling Conditions: Based on our explorations, we predict that variable thicknesses of loose to medium-dense fill soils over medium-dense to very dense glacial soils will be encountered in most

or all soldier pile holes. The upper soils can likely be drilled without difficulties, using a conventional auger, whereas the very dense glacial soils will likely yield slow drilling rates. Although none of our explorations encountered cobbles or boulders, it should be realized that such obstructions could exist at random locations within these deposits.

Driving Loads: Soldier piles should be designed to resist the various applied loads, which can be classified as static pressures, surcharge pressures, seismic pressures, and hydrostatic pressures. Our recommended design pressures are presented graphically on the enclosed *Lateral Earth Pressure Diagrams* (Figure 5) and are discussed in the following paragraphs.

- *Static Pressures*: Static lateral earth pressures are assumed to act over the entire height of each soldier pile. From the top of the pile downward to a level 1 foot below the foreslope, this static pressure should be applied over the soldier pile spacing; below this level, the pressure need be applied over only one pile diameter. For walls that are cantilevered or have one row of tiebacks, we generally recommend using an *active* earth pressure modeled as the series of equivalent fluid unit weights shown on Figure 5.

- *Surcharge Pressures*: Lateral earth pressures acting on the soldier piles should be increased to account for surcharge loads resulting from any traffic, construction equipment, material stockpiles, or structures located within a horizontal distance equal to the wall height. For simplicity, the active and at-rest lateral surcharge pressures developed against a wall can be calculated as 30 percent and 50 percent, respectively, of the imposed vertical surcharge pressure. Also, a traffic surcharge can be modeled as a uniform lateral pressure of 75 psf acting over the upper 6 feet of wall, as shown on Figure 5. The enclosed *Surcharge Pressure Diagrams* (Figure 7) illustrate methods of calculating specific surcharge loads.

- *Seismic Pressures*: Lateral earth pressures acting on permanent soldier piles should be increased to account for seismic loading, which are applied over the piles in the same manner as the static pressures. For the design acceleration coefficient and a wall height of "H" feet, we recommend that the seismic loading be modeled as the uniform horizontal pressures shown on Figure 5.

- *Hydrostatic Pressures*: If groundwater were allowed to collect behind the wall, a net hydrostatic pressure increase of 45 pcf would act against the portion of wall above the foreslope level and below the saturation level. However, if adequate drainage is provided behind the shoring wall, we expect that hydrostatic pressures will *not* develop.

Resisting Forces: Lateral resistance can be computed by using an appropriate allowable passive earth pressure acting over the embedded depth of each soldier pile, neglecting the upper 2 feet. This passive pressure should be applied over a lateral distance equal to the pile spacing or twice the pile diameter, whichever is less. For a level foreslope, the allowable passive pressure can be modeled as the trapezoidal distribution shown on Figure 5.

Pile Capacities and Deflections: Appropriate side-friction and end-bearing capacities can be used to determine total vertical capacities of soldier piles. For the portion of a pile extending into very dense sands or hard silt, our recommended allowable values are shown on the enclosed *Tieback Soldier Pile Wall Diagrams* (Figure 6) and are summarized below. These allowable values incorporate safety factors of 1.5 and 3.0 for temporary and permanent conditions, respectively.

	Allowable Value	
Design Parameter	**Temporary**	**Permanent**
Side Friction Capacity	2000 psf	1000 psf
End Bearing Capacity	30,000 psf	15,000 psf

Construction Monitoring: We recommend that an AMEC representative be retained to continuously monitor the installation of all soldier piles, in order to verify that suitable depths are reached and soil conditions are encountered. This monitoring program would include observation and documentation of installation procedures, construction materials, drilling conditions, soil conditions, and pile plumbness.

6.2.2 Lagging

Applicability: We recommend that lagging be installed between all adjacent soldier piles to reduce the potential for soil failure, loss of ground, and hazardous working conditions.

Lagging Materials: In our opinion, either conventional wooden timber lagging or reinforced shotcrete lagging could be utilized at the site. For permanent shoring wall applications, we recommend that all wooden timber lagging be pressure-treated.

Lateral Pressures: Due to soil arching effects, temporary lagging that spans 8 feet or less need be designed for only 25 percent of the lateral earth pressure previously recommended for soldier pile design. Permanent lagging, on the other hand, should be designed for 50 percent of this same lateral earth pressure.

Backfilling: We recommend that any voids behind the lagging be backfilled, but the backfill material should not prevent groundwater flow. If no drainage is provided behind the lagging, hydrostatic pressure will result. For this reason, materials such as excavation spoils, sand, or pea gravel provide an effective lagging backfill material, whereas lean-mix concrete, controlled-density fill, or other relatively impermeable materials are less suitable.

Drainage Systems: We recommend that all lagging backfill material connect to a continuous horizontal drain located in front of the wall. This can be accomplished either by extending gravel under the lagging or by providing weepholes through the lagging. If concrete or shotcrete walls are to be placed against wooden lagging, prefabricated vertical drainage strips (such as Miradrain) should be attached to each lagging bay and then covered with plastic sheeting.

6.2.3 Tiebacks

Applicability: We anticipate that tieback anchors will be needed to support any soldier pile walls having an exposed height greater than about 15 to 20 feet.

Conflicts and Easements: Because tiebacks typically extend about 30 to 60 feet behind the excavation face, conflicts with underground utilities and adjacent structures often arise. The project structural engineer should carefully consider the locations of such obstructions when laying out all tiebacks. Temporary easements would be required from the City of Seattle for any tiebacks that extend beyond the site property boundaries. It should also be realized that the City generally prohibits the installation of permanent tiebacks within their rights-of-way.

Installation Methods: All tiebacks should be installed in a manner that minimizes caving and associated ground subsidence. Typically, this involves drilling with a full-length casing or continuous flight auger, as well as pumping grout from the bottom of each tieback hole with a tremie.

No-Load Zone: The anchor portion of all tiebacks must be located a sufficient distance behind the retained excavation face to develop resistance within a stable soil mass. We recommend that the anchorage be obtained behind a "no-load zone" defined by a plane projected upward at a 60-degree angle from the base of the excavation and set back from the excavation face a horizontal distance equal to 20percent of the face height, as shown on Figure 5.

Anchor Length and Spacing: The anchor portion of the tieback (that portion behind the no-load zone) should have minimum length of 20 feet and should be located at least 10 feet below the ground surface, as shown on Figure 6. To avoid interactions between adjacent tiebacks, we recommend that a clear spacing of at least 5 feet be maintained along the anchor zones.

Estimated Adhesion: We tentatively estimate that an allowable concrete/soil transfer load of 5,000 pounds per foot can be assumed for the anchor portion of a tieback located within the medium-dense to dense sands, which we generally observed below depths of about 10 feet at the site. However, the actual design values will depend on the installation method and should be confirmed by load-testing all tiebacks in the field.

Load Testing: Field testing of tiebacks is necessary to confirm design assumptions, verify the integrity of individual tiebacks and provide information regarding their long-term creep characteristics. We typically recommend the following field testing program.

- Performance Tests: At least two performance tests should be conducted on the production tiebacks. The test load should equal 150 percent of the design capacity.

- Proof Tests: A proof load equal to 133 percent of the design capacity should be applied to each production tieback.

- Verification Tests: If permanent tiebacks are planned for the project, at least two long-term verification tests should be conducted on sacrificial tiebacks. The

maximum test load should equal 200 percent of the design capacity. Prior to wall construction, AMEC can supply details for conducting these tests.

Construction Monitoring: Because tiebacks require specialized installation and earthwork techniques to maintain stable conditions during and after construction, we strongly recommend that an AMEC representative be retained to continuously monitor all construction activities. This would include observation and documentation of installation procedures, construction materials, drilling conditions, load testing, and lock-off loads.

6.3 Soil Nail Walls

In our opinion, soil nail walls can be used to shore the excavation for the 6th-8th Grade Building, although special treatments might be needed within the near-surface loose fill soils during excavation for the 6th – 8th Grade building. Soil nail walls can be constructed as temporary shoring or as permanent basement walls for the building. Provided the subsurface conditions are favorable, which they are for this site, and a medium to large shoring project, soil snail walls are typically less expensive than soldier pile walls. If the design team elects to utilize soil nailing to shore the excavations, we could perform a complete analysis and provide all geotechnical design criteria. We could also prepare the construction plans, after all excavation limits have been finalized. To facilitate preliminary planning and cost estimating, we offer the following general comments and recommendations concerning soil nail walls.

Conflicts and Easements: Careful layout of all soil nails will be required to avoid any existing underground utilities and structures. Consequently, the design engineer and/or contractor prior to final layout must undertake a thorough review of as-built plans. Temporary easements would be required from the City of Seattle for any soil nails that extend beyond the site property boundaries. It should also be realized that the City generally does not allow permanent nails to encroach on their street right-of-way. However, soil nails would be significantly shorter than tie-back anchors.

Construction Sequencing: Soil nail walls can be constructed using either (1) a “top-down” sequence, in which the temporary facing, rebar, and permanent facing are completed at each step before proceeding downward to the next step, or (2) a “down-and-up” sequence, in which only the temporary facing is placed during each step as the excavation proceeds downward, and then the rebar and permanent facing are completed in an upward direction. Although the top-down sequence seems to be more common, it is more susceptible to delays when sloughing or seepage zones are encountered.

Cut-Face Exposure Time: The contractor should minimize the length of time that any excavation faces are exposed and unsupported. We expect that the medium-dense to dense soils observed at depth will provide generally favorable stand-up conditions, but the upper 5 to 10 feet of loose fill soils appear somewhat prone to sloughing.

Temporary Cut-Face Protection: The need for and methods of temporary cut-face protection should be the contractor's decision. Typically, if excessive sloughing occurs along any portion of the excavation faces, a soil berm is left in front of the face during drilling. This method involves drilling

through the berm, installing the soil nails, then removing the berm immediately before shotcreting the face. Alternatively, a "flash coat" of shotcrete could be applied to the face immediately after excavation; in this case, the nails are drilled through the flash coat, then the structural shotcrete is applied later.

Nail Lengths: Appropriate soil nail lengths vary with the wall height and backslope inclination. Assuming wall heights up to 15 feet and a permanent backslope inclination of 3H:1V or flatter, we tentatively estimate that nail lengths ranging from about 10 to 15 feet would be appropriate.

Nail Declinations: We typically recommend that all soil nails be installed at a 15-degree angle (±3 degrees) below horizontal. However, variations are allowable where necessary to avoid existing utilities or structures.

Nail Spacing: Vertical nail spacing is largely influenced by the existing soil conditions and by the backslope angle, whereas the horizontal spacing can be selected to help avoid conflicts with existing utilities and structures. We tentatively expect that a horizontal nail spacing of 4 to 7 feet and a vertical nail spacing of 4 to 6 feet (center to center) would be appropriate.

Nail Hole Diameters: The diameter of finished soil nails is typically selected by the contractor and is dictated by the required pull-out capacity. However, we recommend that the selected diameter be adequately large to maintain at least ½ inch of grout cover over the tendons.

Bond Capacities: All soil nail wall designs are based on an assumed ultimate soil/grout bond capacity. We tentatively estimate that a bond capacity in the range of 1,600 to 3,200 pounds per linear foot would be feasible.

Wall Facing: After the soil nails are installed, and prior to excavating the next step, reinforcing is placed on the face followed by shotcrete application. If the wall will be permanent, a second coat of shotcrete can be used or a cast-in-place concrete wall can be used to cover up the nail heads.

6.4 Spread Footings

Conventional spread footings will provide adequate support for the 6th-8th Grade building (Phase 1 work) and the proposed 4th – 5th Grade building (Phase 2). However, our recommendations are contingent on the finished floor elevations indicated on the SCDS Masterplan conceptual layout, and on the subgrade soils being properly prepared. We offer the following comments and recommendations for purposes of footing design and construction.

Footing Depths and Widths: For frost and erosion protection, the bottoms of all exterior footings should bear at least 18 inches below adjacent outside grades, whereas the bottoms of interior footings need bear only 12 inches below the surrounding slab surface level. However, greater depths might be needed for bearing purposes in certain locations, as discussed below. To minimize post-construction settlements, continuous (wall) and isolated (column) footings should be at least 18 and 24 inches wide, respectively.

Bearing Subgrades: The loose, uncontrolled fill soils underlying portions of the proposed 6th –8th Grade building are not well-suited for supporting spread footings, due to their moderately high compressibility. In order to provide adequate bearing conditions for spread footings, we recommend that all footings gain support from the native, medium dense to dense advance outwash deposit, which lies at depths on the order of 1 to 10 feet below existing grades. Where the bearing horizon depth exceeds the minimum footing depth required for frost and erosion protection, adequate support can be accomplished by either (1) extending all footings downward to bear directly on the native soils or (2) overexcavating and replacing the overlying uncontrolled fill with bearing pads of suitable structural fill.

Bearing Pads: Overexcavations below footings should allow a prism of structural fill to be placed above a firm and unyielding subgrade. The prism should extend out laterally beyond all sides of the footing an amount equal to the depth of the prism, effectively forming 1H:1V sides of the bearing pad prism.

Subgrade Verification: All footing subgrades should consist of either medium dense, undisturbed, native soils or suitable structural fill materials placed over native soils. Footings should never be cast atop loose, soft, or frozen soil, slough, debris, existing uncontrolled fill, or surfaces covered by standing water. We recommend that the condition of all subgrades be verified by an AMEC representative before any fill and/or concrete is placed.

Bearing Capacities: Based on the bearing subgrade conditions described above, we recommend that all footings be designed for the following allowable soil bearing capacities. These values incorporate static and seismic safety factors of at least 2.0 and 1.5, respectively.

	Allowable Bearing Capacity	
Footing Location	**Static**	**Seismic**
Dense/Hard Native Soils	4,000 psf	5,300 psf
Structural fill and medium-dense native soils	2,500 psf	3,300 psf

Footing Settlements: We estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed 1 inch. Differential settlements could approach one-half of the actual total settlement between adjacent foundation elements. These settlements would be reduced if the actual design bearing pressures are lower than our recommended maximum pressures.

Footing and Stemwall Backfill: To provide erosion protection and lateral load resistance, we recommend that all footing excavations be backfilled with structural fill on both sides of the footings and stemwalls after the concrete has cured. All footing backfill soil should be compacted to a density of at least 90 percent (based on ASTM:D-1557).

Lateral Resistance: Footings and stemwalls that have been properly backfilled as described above will resist lateral movements by means of passive earth pressure and base friction. We recommend using the following design values, which incorporate static and seismic safety factors of at least 1.5 and 1.1, respectively. Base friction can be combined with the respective passive pressure to resist static and seismic loads.

Design Parameter	Allowable Value
Static Passive Pressure	300 pcf
Seismic Passive Pressure	400 pcf
Base Friction Coefficient	0.4

6.5 Slab-on-Grade Floors

Soil-supported slab-on-grade floors can be used in the proposed buildings if the subgrades are properly prepared. We offer the following comments and recommendations concerning slab-on-grade floors.

Subgrade Conditions and Verification: All soil-supported slab-on-grade floors should bear on firm, unyielding native soils or on suitable structural fill soils. We recommend that the condition of all subgrades and overlying layers are verified by an AMEC representative before any fill or concrete is placed.

Floor Subbase: Structural fill subbases do not appear to be needed under soil-supported slab-on-grade floors at the site. However, the final decision regarding the need for subbases should be based on actual subgrade conditions observed at the time of construction.

Capillary Break: To retard the upward wicking of groundwater beneath the floor slab and to provide a smooth bearing surface, we recommend that a capillary break be placed over the subgrade. Ideally, this capillary break would consist of a 4-inch-thick layer of pea gravel or other clean, uniform, well-rounded gravel, such as “Gravel Backfill for Drains” per WSDOT: 9-03.12(4). Alternatively, angular gravel or crushed rock can be used if it is sufficiently clean and uniform to prevent capillary wicking.

Vapor Barrier: We recommend that a layer of durable plastic sheeting (such as Crosstuff, Moistop, or Visqueen) be placed directly between the capillary break and the floor slab to prevent ground moisture vapors from migrating upward through the slab. The contractor should exercise care to avoid puncturing it while casting the slab.

Curing Course: A “curing course” is a thin layer (typically 2 inches thick) of clean sand that is sometimes placed over the vapor barrier to facilitate uniform curing of the overlying concrete slab. Recent studies, however, have indicated that this course is not necessary when moderately strong concrete is used for the slab, and some structural engineers believe it can be detrimental to a slab’s long-term performance. Consequently, we recommend that the project structural engineer be allowed to decide whether a curing course should be used.

Vertical Deflections: Soil-supported slab-on-grade floors can deflect downward when vertical loads are applied, due to elastic compression of the subgrade. In our opinion, a subgrade reaction modulus of 200 pounds per cubic inch can be used to estimate such deflections.

6.6 Drainage Systems

All the proposed buildings should be provided with permanent drainage systems to minimize the risk of future moisture problems. We offer the following recommendations and comments for drainage design and construction purposes.

Perimeter Drains: We recommend that each building be encircled with a perimeter drain system to collect seepage water. This drain should consist of a 4-inch-diameter perforated pipe within an envelope of pea gravel or washed rock, extending at least 6 inches on all sides of the pipe, and the gravel envelope should be wrapped with filter fabric to reduce the migration of fines from the surrounding soils. Ideally, the drain invert would be installed no more than 8 inches above or below the base of the perimeter footings.

Subfloor Drains: Based on the groundwater conditions observed in our site explorations, we do not infer a need for subfloor drains. However, the final decision regarding the need for subfloor drains should be made at the time of construction, after the floor subgrade has been exposed.

Runoff Water: Roof-runoff and surface-runoff water should *not* be allowed to flow into the drainage systems. Instead, these sources should flow into separate tightline pipes and be routed away from the buildings to an appropriate location. Also, final site grades should slope downward away from each building so that runoff water will flow by gravity to suitable collection points, rather than ponding near the buildings. Ideally, the area surrounding the buildings would be capped with concrete, asphalt, or low-permeability (silty) soils to minimize or preclude surface-water infiltration.

Discharge Considerations: If possible, all perimeter drains should discharge to a municipal storm drain, sewer system, detention system, or other suitable location by gravity flow. However, the depth of the basement excavation relative to existing utilities might not allow for gravity flow. In this event, we recommend that an on-demand pump be provided to collect groundwater and discharge it to a suitable location. Check valves should be installed along any drainpipes that discharge to a sewer system, to prevent sewage backflow into the drain system. Alternatively, the basement could be designed as a submerged structure and provided with an effective waterproofing treatment.

Seepage Quantities: We tentatively expect that groundwater seepage flow volumes will be moderate, based on the conditions observed in our explorations. However, a site-specific groundwater seepage analysis would be required to estimate a seepage quantity for a given excavation size and depth. After the final excavation dimensions have been established, we could perform such an analysis to facilitate the design of a drainage system by the project civil engineer, if desired.

6.7 Backfilled Walls

In our opinion, backfilled concrete retaining walls can be used around below-grade portions of the building and to support the proposed cuts and fills that don't require a shoring wall. Our backfilled wall design recommendations and comments are presented below.

Footing Depths: For frost and erosion protection, all backfilled retaining wall footings should bear at least 18 inches below the adjacent ground surface. However, greater depths might be necessary to develop adequate passive resistance and/or bearing resistance in certain cases.

Curtain Drains: To preclude hydrostatic pressure development behind a backfilled retaining wall, we recommend that a curtain drain be placed behind the entire wall. This curtain drain should consist of pea gravel, washed rock, or some other clean, uniform, well-rounded gravel, extending outward a minimum of 2 feet from the wall and extending upward from the footing drain to within about 12 inches of the ground surface. For walls that do not include a perimeter drain, we recommend that a 4-inch-diameter perforated drain pipe be installed behind the heel of the wall.

Backfill Soil: Ideally, all retaining wall backfill placed behind the curtain drain would consist of clean, free-draining, granular material, such as "Gravel Backfill for Walls" per WSDOT Standard Specification 9-03.12(2). Alternatively, on-site granular soils could be used as backfill if they are placed at a moisture content near optimum. In the event that silty soils are used as backfill, a geotextile should be placed between the curtain drain and the backfill soil, to prevent drain clogging.

Backfill Compaction: Because soil compactors place significant lateral pressures on retaining walls, we recommend that only small, hand-operated compaction equipment be used within 3 feet of a backfilled wall. Also, all backfill should be compacted to a density as close as possible to 90 percent of the maximum dry density (based on ASTM:D-1557); a greater degree of compaction closely behind the wall would increase the lateral earth pressure, whereas a lesser degree of compaction might lead to excessive post-construction settlements.

Grading and Capping: To retard the infiltration of surface water into the backfill soils, we recommend that the backfill surface of exterior walls be adequately sloped to drain away from the wall. Ideally, the backfill surface directly behind a wall would be capped with asphalt, concrete, or 12 inches of low-permeability (silty) soils to minimize or preclude surface water infiltration.

Applied Loads: Overturning and sliding loads applied to retaining walls can be classified as static pressures, surcharge pressures, seismic pressures, and hydrostatic pressures. We offer the following specific values for design purposes.

- *Static Pressures*: Yielding (cantilever) retaining walls should be designed to withstand an appropriate *active* lateral earth pressure, whereas non-yielding (restrained) walls should be designed to withstand an appropriate *at-rest* lateral earth pressure. These pressures act over the entire back of the wall and vary with the backslope inclination. For various backslope angles, we recommend using the following active and at-rest pressures (given as equivalent fluid unit weights):

Backslope Angle	Active Pressure	At-Rest Pressure
Level	35 pcf	55 pcf
3.0H:1V	44 pcf	69 pcf
2.0H:1V	53 pcf	83 pcf

- *Surcharge Pressures*: Static lateral earth pressures acting on a retaining wall should be increased to account for surcharge loadings resulting from any traffic, construction equipment, material stockpiles, or structures located within a horizontal distance equal to the wall height. For simplicity, a traffic surcharge can be modeled as a uniform pressure of 75 psf acting against the upper 6 feet of wall.

- *Seismic Pressures*: Static lateral earth pressures acting on a retaining wall should be increased to account for seismic loadings. These pressures act over the entire back of the wall and vary with the backslope inclination, the seismic acceleration, and the wall height. Based on the design acceleration coefficient and a wall height of "H" feet, we recommend that these seismic loadings be modeled as the following uniform horizontal pressures for various backslope angles:

Backslope Angle	Active Pressure	At-Rest Pressure
Level	4H psf	12H psf
3.0H:1V	6H psf	18H psf
2.0H:1V	8H psf	24H psf

Resisting Forces: Static pressures, surcharge pressures, and seismic pressures, are resisted by a combination of passive lateral earth pressure, base friction, and subgrade bearing capacity. Passive pressure acts over the embedded front of the wall (neglecting the upper 1 foot for paved foreslopes, or the upper 2 feet for soil foreslopes) and varies with the foreslope declination, whereas base friction and bearing capacity act along the bottom of the footings. Assuming a level foreslope at the wall location, we recommend the following design values, which incorporate static and seismic safety factors of at least 1.5 and 1.1, respectively. Base friction can be combined with the respective passive pressure to resist static and seismic loads.

Design Parameter	Allowable Value
Static Passive Pressure	300 pcf
Seismic Passive Pressure	400 pcf
Base Friction Coefficient	0.4
Static Bearing Capacity	2,500 psf
Seismic Bearing Capacity	3,300 psf

6.8 Underground Utilities

We expect that underground utilities, such as waterlines, storm drains, sewer pipes, manholes, and catch basins, will be included in the site development. Our comments and recommendations concerning the installation of these utilities are presented below.

Soil Classifications: Based on our explorations, we interpret the on-site soils to conform with the following OSHA soil classifications. However, these interpreted soil types should be confirmed after the initial excavations have begun. In all cases, the utility excavations should be performed in accordance with appropriate governmental guidelines.

On-Site Soil Type	OSHA Soil Type
Loose to Medium-Dense SAND	C
Medium-Dense to Dense Silty SAND	B
Stiff to Hard Silt	A
Glacial Till	A

Subgrade Soils: Based on our explorations, we expect that most or all utility excavations will extend into soils that will adequately support utility pipes, catch basins, vaults, and similar structures. If localized zones of soft or organic soils are encountered in utility excavations, we generally recommend that they be overexcavated to a maximum depth of 24 inches and be replaced with a suitable fill material compacted to a uniform density of at least 90 percent (based on ASTM:D-1557).

Soil Corrosivity: Our scope of work did not include corrosivity testing of the on-site soils. However, based on our classifications of these soils and on our previous corrosivity testing of similar soil types, we infer that the on-site soils have a low likelihood of being corrosive to utilities.

Bedding Soils: Utility pipes should be bedded with an appropriate material that extends at least 6 inches outward from the pipe in all directions. For level or gently sloping pipes, we recommend using a clean, uniform, well-rounded material such as pea gravel or “Gravel Backfill for Pipe Bedding” per WSDOT: 9-03.12(3). For moderately or steeply sloping pipes, on the other hand, we recommend using a clean, uniform, angular material such as “Crushed Surfacing Top course” per WSDOT: 9-03.9(3), in order to minimize groundwater flow rates through the bedding.

Backfill Soils: The on-site, non-organic, granular soils can be used as utility excavation backfill if they are placed at a moisture content near optimum. During the wet season or during rainy periods,

however, all backfill material used for utility trenches and other excavations would probably need to consist of well-graded granular soils such as "Gravel Borrow" per WSDOT: 9-03.14.

Backfill Compaction: We generally recommend that utility backfill soils be compacted to a density commensurate with surrounding fill or native soils, as well as with the requirements of any overlying structures. For backfill placed under future concrete floors or drive slabs, all soil should be compacted to a uniform density of at least 90 percent (based on ASTM:D-1557). For backfill placed under future asphaltic pavements, the upper 2 feet should be compacted to at least 95 percent.

6.9 Asphaltic Pavements

We understand that asphaltic pavements will be used for the new car-parking areas, and access drives for cars, trucks, and bus driveways. The following comments and recommendations are given for pavement design and construction purposes.

Subgrade Preparation: All soil subgrades should be proof-rolled with a loaded dump truck or heavy compactor to verify the density. Any areas where uncontrolled fill are present at or closely beneath the pavement subgrade, as well as any localized zones of yielding subgrade disclosed during this proof-rolling operation, should be overexcavated to a maximum depth of 24 inches and replaced with a suitable structural fill material. All structural fill should be compacted according to our recommendations given in the *Structural Fill* section. Specifically, the upper 2 feet of soils underlying pavement section should be compacted to at least 95 percent, and all soils below 2 feet should be compacted to at least 90 percent (based on ASTM:D-1557).

Soil Design Values: Soil conditions can be defined by a California Bearing Ratio (CBR), which quantitatively predicts the effects of wheel loads imposed on a saturated subgrade. Based on our classifications of on-site soils and our previous laboratory testing performed on similar soils, we estimate that the near-surface soils will provide a CBR value of about 10 percent.

Traffic Design Values: Traffic conditions can be defined by a Traffic Index (TI), which quantifies the combined effects of projected car, truck, and bus traffic. Although no specific traffic data was available at the time of our analysis, we estimate that a TI of 4.0 is appropriate for high-volume car traffic areas and large parking lots, and that a TI of 5.5 is appropriate for driveways subjected to frequent passes by small freight trucks.

Conventional Sections: A conventional pavement section typically comprises an asphalt concrete pavement over a crushed rock base course over a granular subbase course. Based on the estimated design values stated above, we recommend using the following minimum conventional pavement sections:

	Minimum Thickness	
Pavement Course	**Car Areas**	**Driveways**
Asphalt Concrete Pavement	2½ inches	3½ inches
Crushed Rock Base	4 inches	8 inches

Alternative Sections: As an alternative to the above-recommended conventional section, an asphalt-treated base (ATB) could be substituted for the crushed rock base and granular subbase. The use of an ATB course results in a thinner overall section, and it serves as an all-weather working surface during construction. We specifically recommend the following minimum alternative pavement sections:

	Minimum Thickness	
Pavement Course	**Car Areas**	**Driveways**
Asphalt Concrete Pavement	2½ inches	3½ inches
Asphalt-Treated Base	2½ inches	5 inches

Compaction and Verification: All base course material should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM:D-1557), and all asphalt concrete should be compacted to at least 92 percent of the Rice value (ASTM:D-2041). We recommend that an AMEC representative be retained to verify the compaction of each course before any overlying layer is placed. For the pavement course, compaction is best verified by means of frequent density testing; for the base course, methodology observations and hand-probing are more appropriate than density testing.

Pavement Life and Maintenance: It should be realized that no asphaltic pavement is maintenance-free. The above described pavement sections represent our minimum recommendations for an average level of performance during a 20-year design life; therefore, an average level of maintenance will likely be required. Furthermore, a 20-year pavement life typically assumes that an overlay will be placed after about 10 years. Thicker asphalt, base, and subbase courses would offer better long-term performance, but would cost more initially; thinner courses would be more susceptible to "alligator" cracking and other failure modes. As such, pavement design can be considered a compromise between a high initial cost and low maintenance costs versus a low initial cost and higher maintenance costs.

6.10 Structural Fill

The term "structural fill" refers to any materials used for building pads, roadway embankments, and detention pond berms, as well as materials placed under foundations, retaining walls, slab-on-grade floors, sidewalks, pavements, and other such features. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, granulithic gravel, pea gravel, washed rock, crushed rock, quarry spalls, controlled-density fill (CDF), lean-mix concrete (LMC), well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, or any individual particles greater than about 6 inches in diameter.

Fill Placement: Generally, pea gravel, washed rock, quarry spalls, CDF, and LMC do not require special placement and compaction procedures. In contrast, clean sand, granulithic gravel, crushed rock, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM:D-1557) as a standard, we recommend that structural fill used for various on-site applications be compacted to the following minimum densities:

Fill Application	Minimum Compaction
Building pad	90 percent
Footing subgrade or bearing pad	90 percent
Footing and stemwall backfill	90 percent
Slab-on-grade floor subgrade and subbase	90 percent
Retaining wall subgrade	90 percent
Retaining wall backfill	90 percent
Concrete sidewalk subgrade	90 percent
Asphaltic pavement base	95 percent
Asphaltic pavement subgrade (upper 2 feet)	95 percent
Asphaltic pavement subgrade (below 2 feet)	90 percent

Subgrade Verification and Compaction Testing: Regardless of material or location, all structural fill should be placed over firm, unyielding subgrades prepared in accordance with the *Site Preparation* section of this report. The condition of all subgrades should be verified by an AMEC representative before filling or construction begins. Also, fill soil compaction should be verified by means of in-place density tests performed during fill placement so that adequacy of soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (that soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 Sieve.

CDF Strength Considerations: CDF is normally specified in terms of its compressive strength, which typically ranges from 50 to 200 psi. CDF having strength of 50 psi (7,200 psf) provides adequate support for most structural applications and can be readily excavated with hand shovels. A strength of 100 psi (14,400 psf) provides additional support for special applications but greatly increases the difficulty of hand-excavation. In general, CDF having a strength greater than about 100 psi requires power equipment to excavate and, as such, should not be used where future hand-excavation might be needed.

7.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Consequently, we recommend that AMEC be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design;
- Prepare a letter summarizing all review comments (as required by the City of Seattle);
- Attend a pre-construction conference with the design team and contractor to discuss important geotechnically related construction issues;
- Monitor the installation of all shoring walls to verify conformance with the construction plans and to document the contractor's procedures;
- Review all shoring wall deflection data collected by the project surveyor;
- Observe all exposed subgrades after completion of stripping and overexcavation to confirm that suitable soil conditions have been reached and to determine appropriate subgrade compaction methods;
- Monitor the placement of all structural fill and test the compaction of structural fill soils to verify their conformance with the construction specifications;
- Check all completed subgrades for footings and slab-on-grade floors before concrete is poured, in order to verify their bearing capacity;
- Monitor the conditions of the erosion control measures implemented on the site during the course of construction;
- Observe the installation of all perimeter drains, wall drains, and capillary break layers to verify their conformance with the construction plans; and
- Prepare a post-construction letter summarizing all field observations, inspections, and test results (as required by the City of Seattle).

In addition to the aforementioned services, AMEC can provide inspection and testing of concrete, steel, masonry, and other structural materials. Upon request, we could submit a proposal for providing some or all of these construction monitoring, inspection, and testing services. Such a proposal is best prepared after the project plans and specifications have been approved for construction.

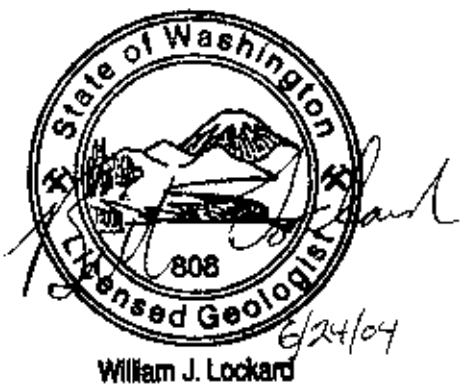
8.0 CLOSURE

The conclusions and recommendations presented in this report are based, in part, on the explorations that we performed and utilized for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. AMEC is available to provide geotechnical monitoring, soils and concrete testing, steel and masonry inspection, and other services throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Sincerely,

AMEC Earth & Environmental, Inc.

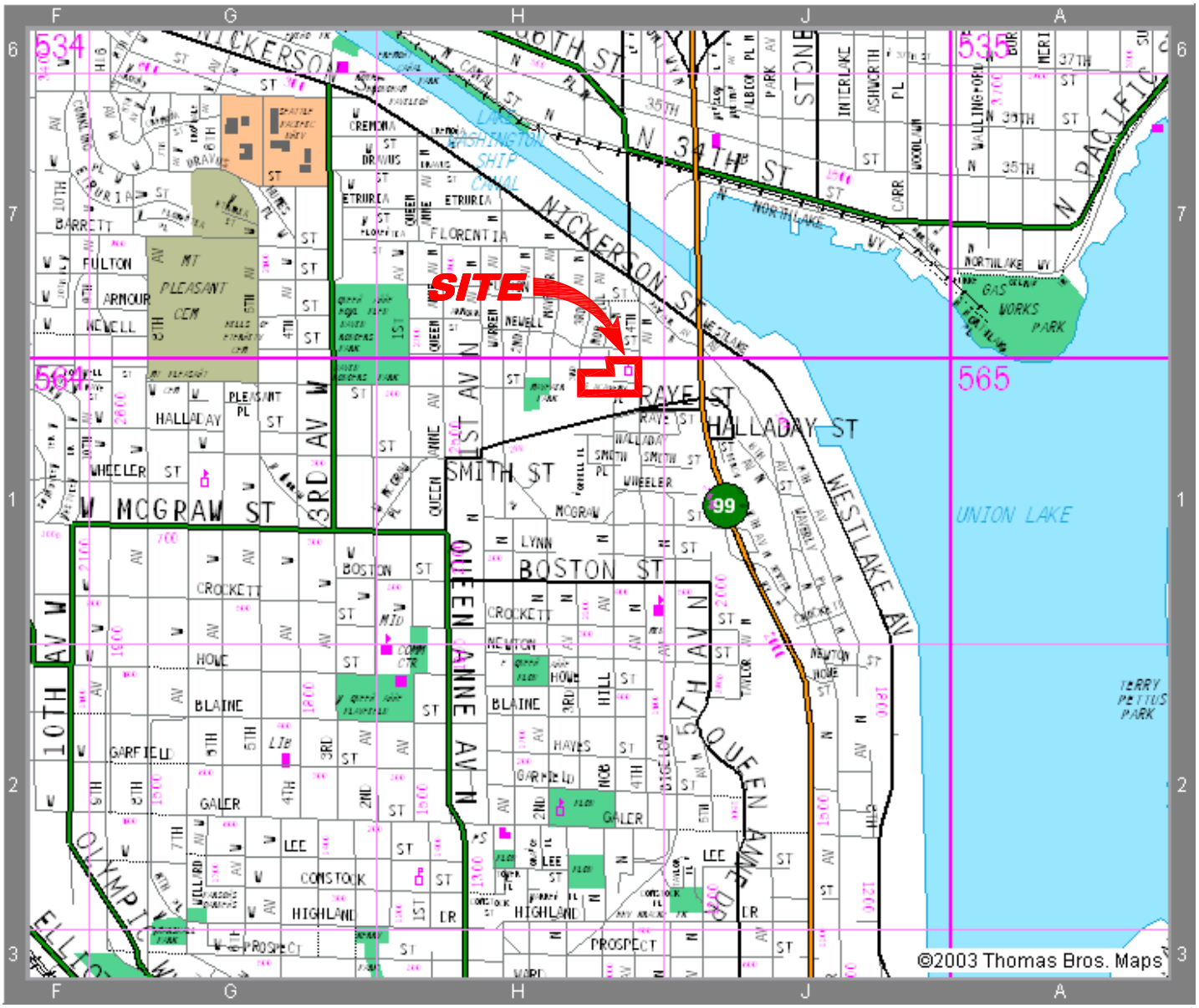


William J. Lockard, L.E.G.
Senior Project Geologist

Todd D. Wentworth, P.E., L.G.
Senior Project Engineer

WJL/TDW/clt

FIGURES



N.T.S.

JOB NO.: 3-91M-14692-0 | DWG DATE: 06-27-2003 | SCALE: N.T.S. | DESIGN BY: JdLC | FILE NAME: LOCATION.DWG

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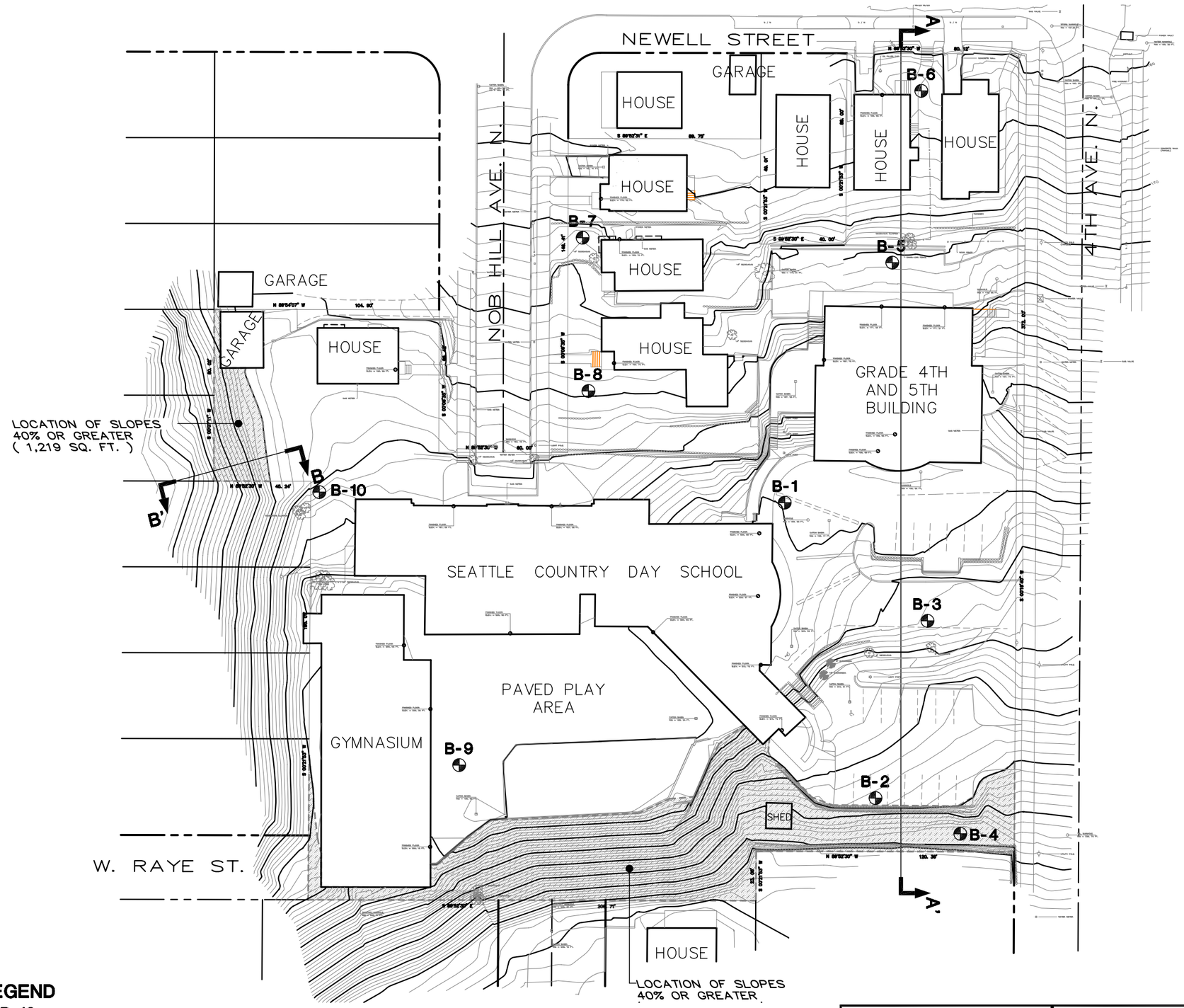
Kirkland, WA, U.S.A. 98034-6918

LOCATION MAP

SEATTLE COUNTRY DAY SCHOOL

SEATTLE, WASHINGTON

FIGURE 1



LEGEND

B-10 — BORING NUMBER AND APPROXIMATE LOCATION

B — B' — GEOLOGIC CROSS-SECTION

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SITE AND EXPLORATION PLAN

SEATTLE COUNTRY DAY SCHOOL

SEATTLE, WASHINGTON

FIGURE 2

JOB NO.: 03-91M-14692-0 | DWG DATE: 06-23-2004 | SCALE: 1"=50' | DESIGN BY: JdLC | FILE NAME: FIG-2.DWG

A (NORTH)

A' (SOUTH)

PROPERTY LINE

NEWELL STREET

PROPOSED 6TH–8TH GRADE BUILDING (PHASE 1)

PROPOSED 4TH–5TH GRADE BUILDING (PHASE 2)

MAIN PARKING (EXISTING)

UPPER PARKING (EXISTING)

LOWER PARKING (EXISTING)

EXISTING 4TH AND 5TH GRADE BUILDING

EXISTING HOUSE

PAVEMENT

APPROXIMATE AREA OF EXCAVATION

B-1 Offset = 55' W — TD 61.5'

B-2 Offset = 10' W — TD 41.5'

B-3 Offset = 13' E — TD 41.5'

B-4 Offset = 25' E — TD 21.5'

B-5 Offset = 5' W — TD 25.0'

B-6 Offset = 10' E — TD 11.0'

ELEVATION IN FEET

240
220
200
180
160
140
120

0 30 60 90 120 150 180 210 240 270 300 330 360 390 400

HORIZONTAL DISTANCE IN FEET

LEGEND

B-6 Offset = 10' E — BORING NUMBER AND APPROXIMATE LOCATION OFFSET FROM SECTION LINE

TD 11.0' — TOTAL DEPTH OF BORING

P — PERCHED GROUNDWATER LEVEL AT TIME OF DRILLING

GROUNDWATER LEVEL AT TIME OF DRILLING

Qvt	GLACIAL TILL (WEATHERED)
Qva	ADVANCED GLACIAL OUTWASH
Qvgl	ADVANCED GLACIOLACUSTRINE
Hf	HOLOCENE FILL
Hp	HOLOCENE PEAT (REMNANT TOPSOIL)

NOTES:

THE STRATA ARE BASED UPON INTERPOLATION BETWEEN EXPLORATIONS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.

SIMPLIFIED NAMES ARE SHOWN FOR SOIL DEPOSITS, BASED ON GENERALIZATIONS OF SOIL DESCRIPTIONS. SEE EXPLORATION LOGS AND REPORT TEXT FOR COMPLETE SOIL DESCRIPTIONS.

0 20 40
VERTICAL SCALE IN FEET

0 30 60
HORIZONTAL SCALE IN FEET

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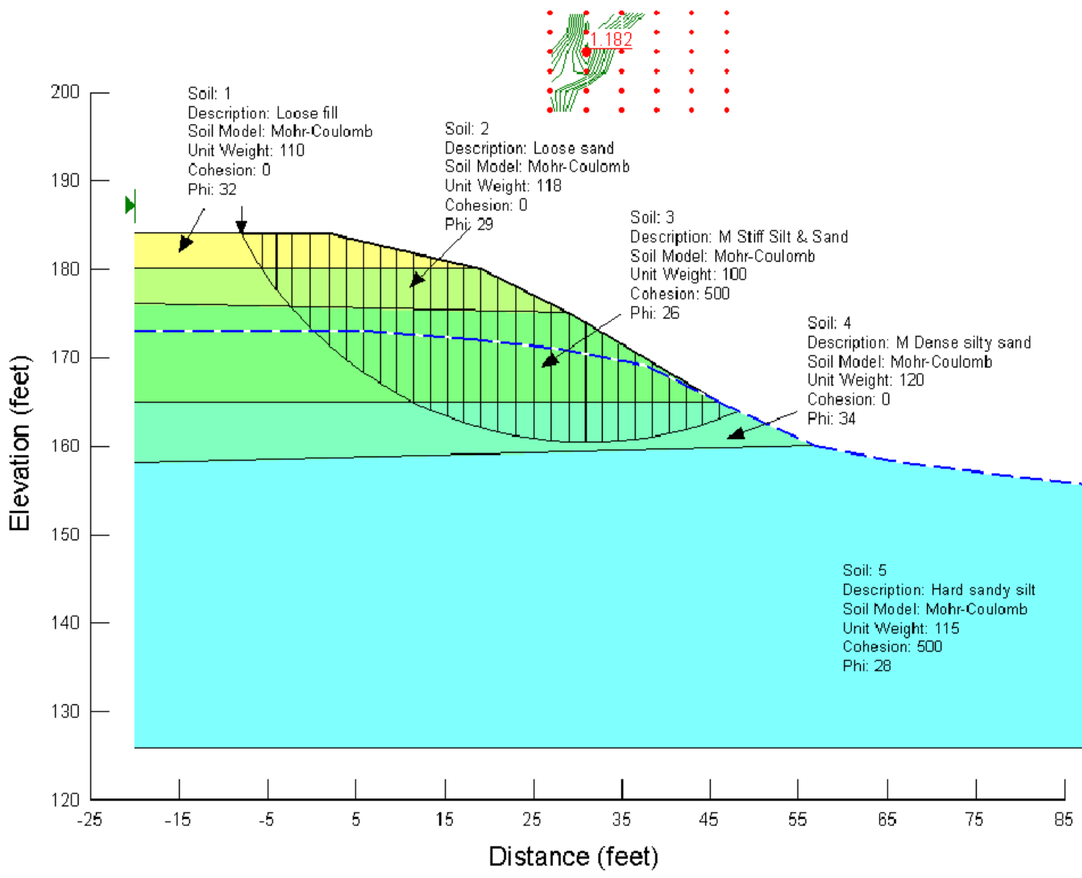
CROSS SECTION A–A'

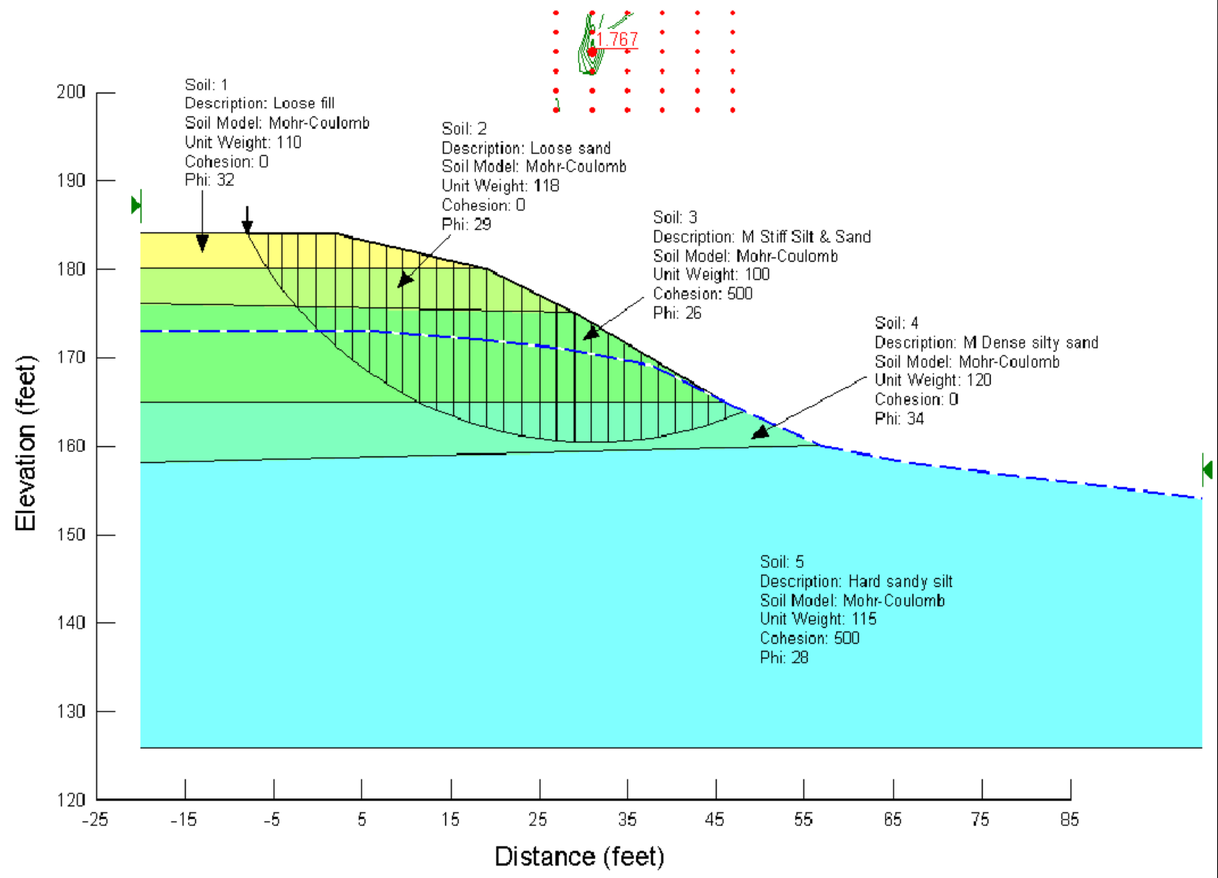
SEATTLE COUNTRY DAY SCHOOL

SEATTLE, WASHINGTON

FIGURE 3



4a. SEISMIC



4b. STATIC

JOB NO.: 03-91M-14692-0 | DWG DATE: 06-23-2004 | SCALE: 1"=50' | DESIGN BY: WJL | FILE NAME: FIG-4.DWG

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SLOPE STABILITY ANALYSIS

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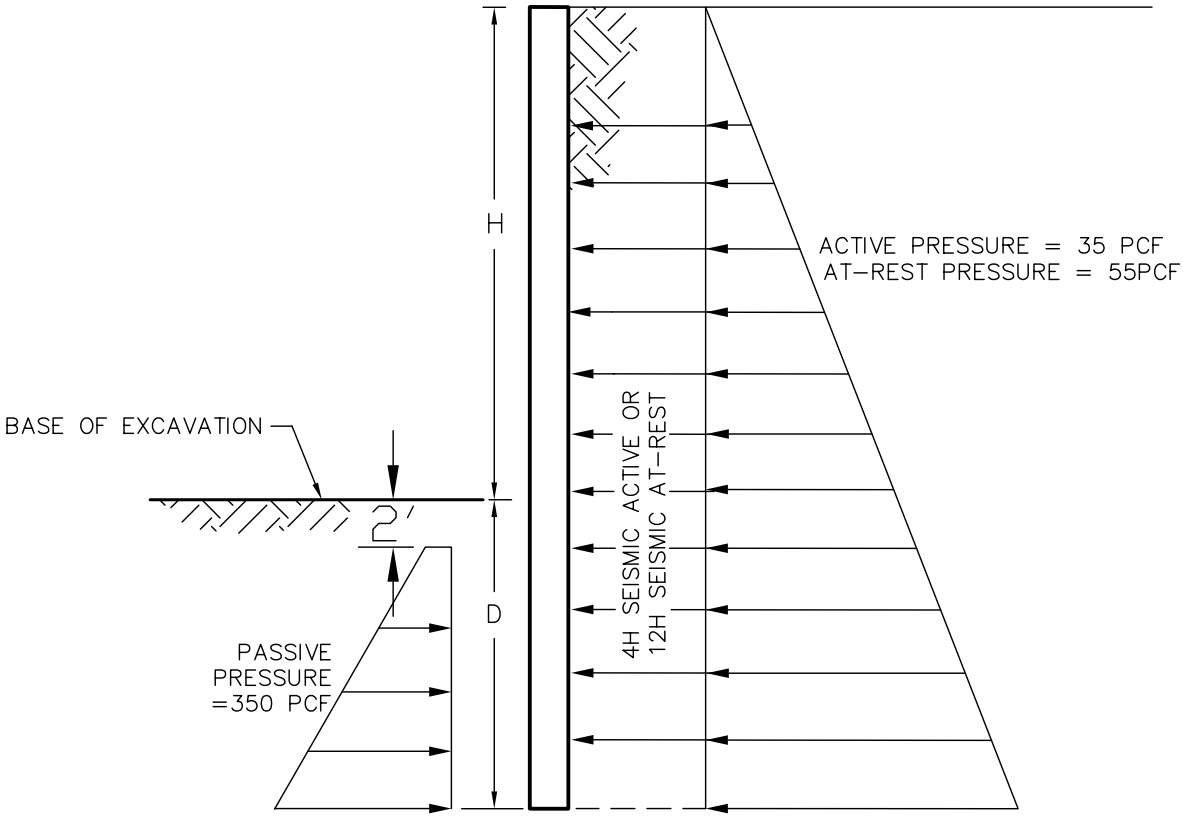
SEATTLE, WASHINGTON

FIGURE

4



NOTES:

1. ALL UNITS IN POUNDS AND FEET.
2. ACTIVE OR AT-REST PRESSURES SHOWN ARE FOR LEVEL BACKFILL BEHIND THE WALL.
3. PASSIVE PRESSURE APPLIED OVER TWO CONCRETED PILE DIAMETERS OR THE PILE SPACING, WHICHEVER IS LESS.
4. ACTIVE OR AT-REST PRESSURES APPLY OVER PILE SPACING ABOVE WALL BASE AND OVER PILE DIAMETER BELOW WALL BASE.
5. WALL DESIGN MUST SATISFY FORCE AND MOMENT EQUILIBRIUM.
6. SEE REPORT TEXT FOR ADDITIONAL RECOMMENDATIONS.

JOB NO.: 01-91M-14692-0 | DWG DATE: 08-01-2003 | SCALE: N.T.S. | DESIGN BY: TDW | FILE NAME: LATERAL PRESSURE.DWG

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LATERAL EARTH PRESSURE FOR SOLDIER PILE WALL

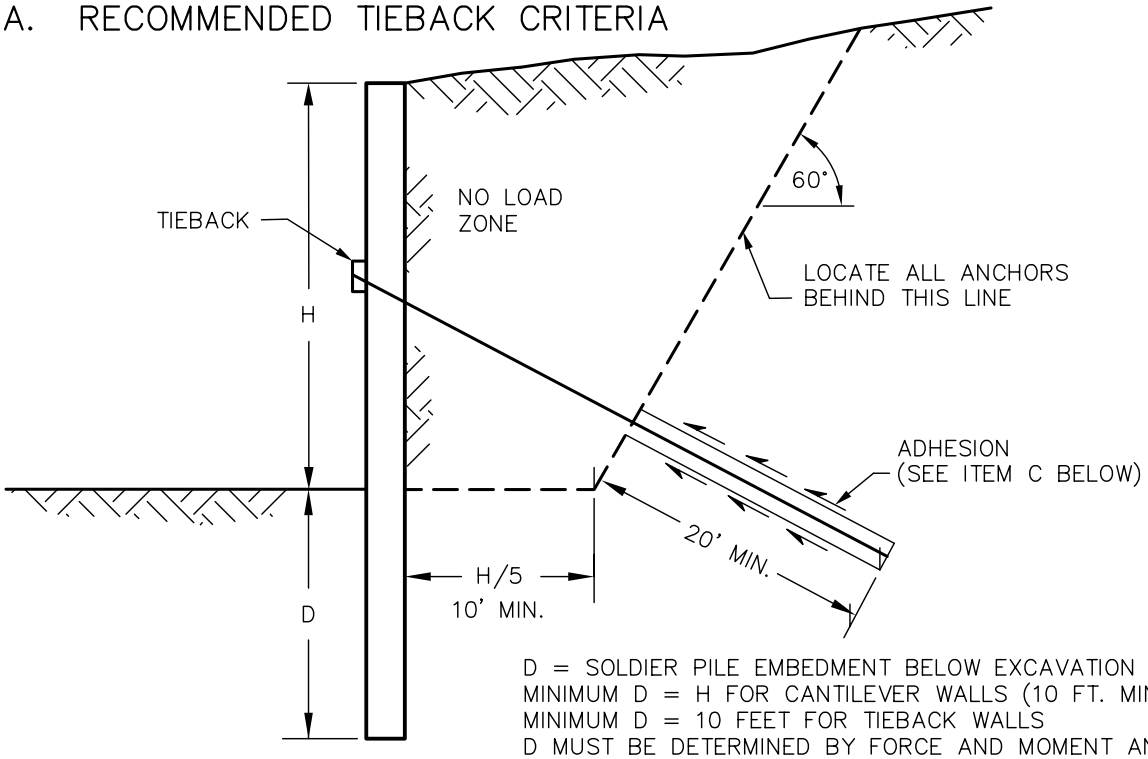
SEATTLE COUNTRY DAY SCHOOL

SEATTLE, WASHINGTON

FIGURE

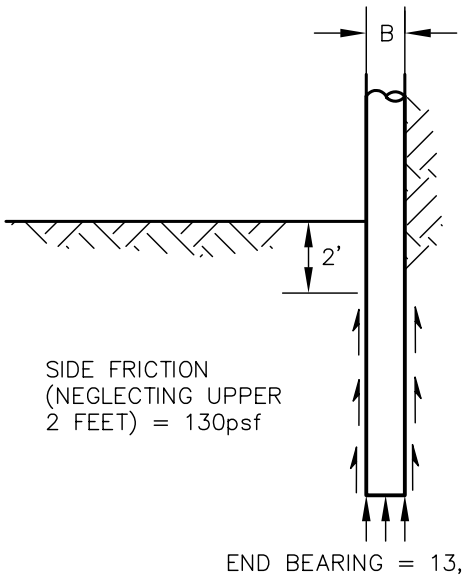
5

A. RECOMMENDED TIEBACK CRITERIA



D = SOLDIER PILE EMBEDMENT BELOW EXCAVATION BASE
MINIMUM D = H FOR CANTILEVER WALLS (10 FT. MIN.)
MINIMUM D = 10 FEET FOR TIEBACK WALLS
D MUST BE DETERMINED BY FORCE AND MOMENT ANALYSES
D MUST ALSO BE ADEQUATE TO PROVIDE VERTICAL CAPACITY

B. SOLDIER PILE VERTICAL CAPACITY



C. ESTIMATED TIEBACK ANCHOR ADHESION

SOIL TYPE	ADHESION (plf)
MEDIUM–DENSE TO DENSE SAND	5,000

VERIFY ADHESION WITH VERIFICATION TESTS, AND PERFORMANCE TESTS

JOB NO.: 01-91M-14692-0 | DWG DATE: 08-01-2003 | SCALE: N.T.S. | DESIGN BY: TDW | FILE NAME: SOL-PI-WALL.DWG

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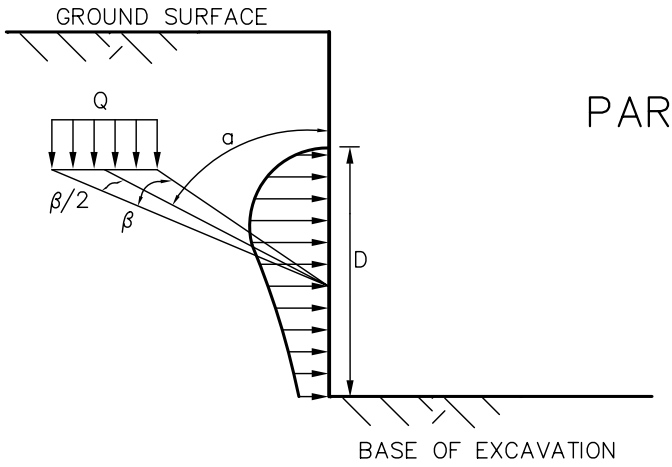
TIEBACK SOLDIER PILE WALL DIAGRAM

SEATTLE COUNTRY DAY SCHOOL

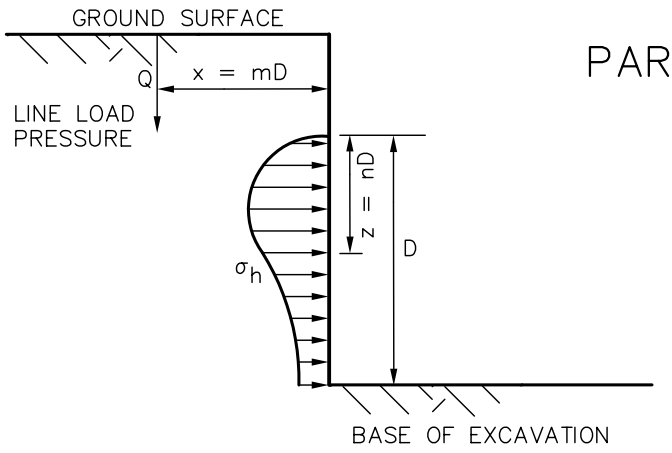
SEATTLE, WASHINGTON

FIGURE 6



STRIP FOOTING PARALLEL TO EXCAVATION

$$\sigma_h = 0.64Q(\beta - \sin\beta\cos 2a)$$



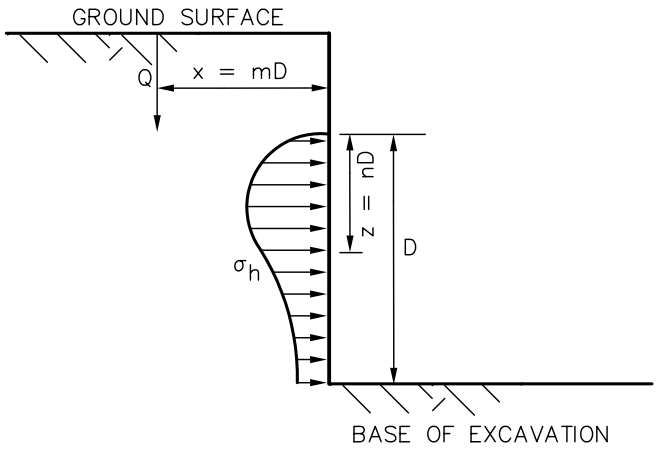
LINE LOAD PARALLEL TO EXCAVATION

(FOR $m > 0.4$)

$$\sigma_h = \frac{1.28Q}{D} \cdot \frac{m^2 n}{(m^2 + n^2)^2}$$

(FOR $m \leq 0.4$)

$$\sigma_h = \frac{Q}{D} \cdot \frac{0.2\ n}{(0.16 + n^2)^2}$$



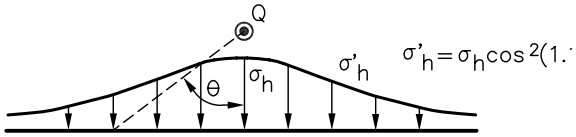
POINT LOAD

(FOR $m > 0.4$)

$$\sigma_h = \frac{1.77Q}{D^2} \cdot \frac{m^2 n^2}{(m^2 + n^2)^3}$$

(FOR $m \leq 0.4$)

$$\sigma_h = \frac{0.28Q}{D^2} \cdot \frac{n^2}{(0.16 + n^2)^3}$$



PLAN VIEW OF WALL

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SURCHARGE PRESSURE DIAGRAMS

SEATTLE COUNTRY DAY SCHOOL

SEATTLE, WASHINGTON

FIGURE 7

JOB NO.: 01-91M-14692-0 | DWG DATE: 08-01-2003 | SCALE: N.T.S. | DESIGN BY: TDW | FILE NAME: PRESSURE.DWG

APPENDIX A

FIELD EXPLORATION PROCEDURES AND LOGS

APPENDIX A
FIELD EXPLORATION PROCEDURES AND LOGS
3-91M-14692-0

The following paragraphs describe our procedures associated with the field explorations and field tests that we conducted for this project. Descriptive logs of our explorations are enclosed in this appendix.

Auger Boring Procedures

Our exploratory borings were advanced with a hollow-stem auger, using a trailer-mounted drill rig and a portable drill rig operated by an independent drilling firm working under subcontract to AMEC. An engineering geologist from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our laboratory for further visual examination and testing. After each boring was completed, the borehole was backfilled with a mixture of bentonite chips and soil cuttings, and the surface was patched with asphalt or concrete (where appropriate).

Throughout the drilling operation, soil samples were obtained at 2- or 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM:D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

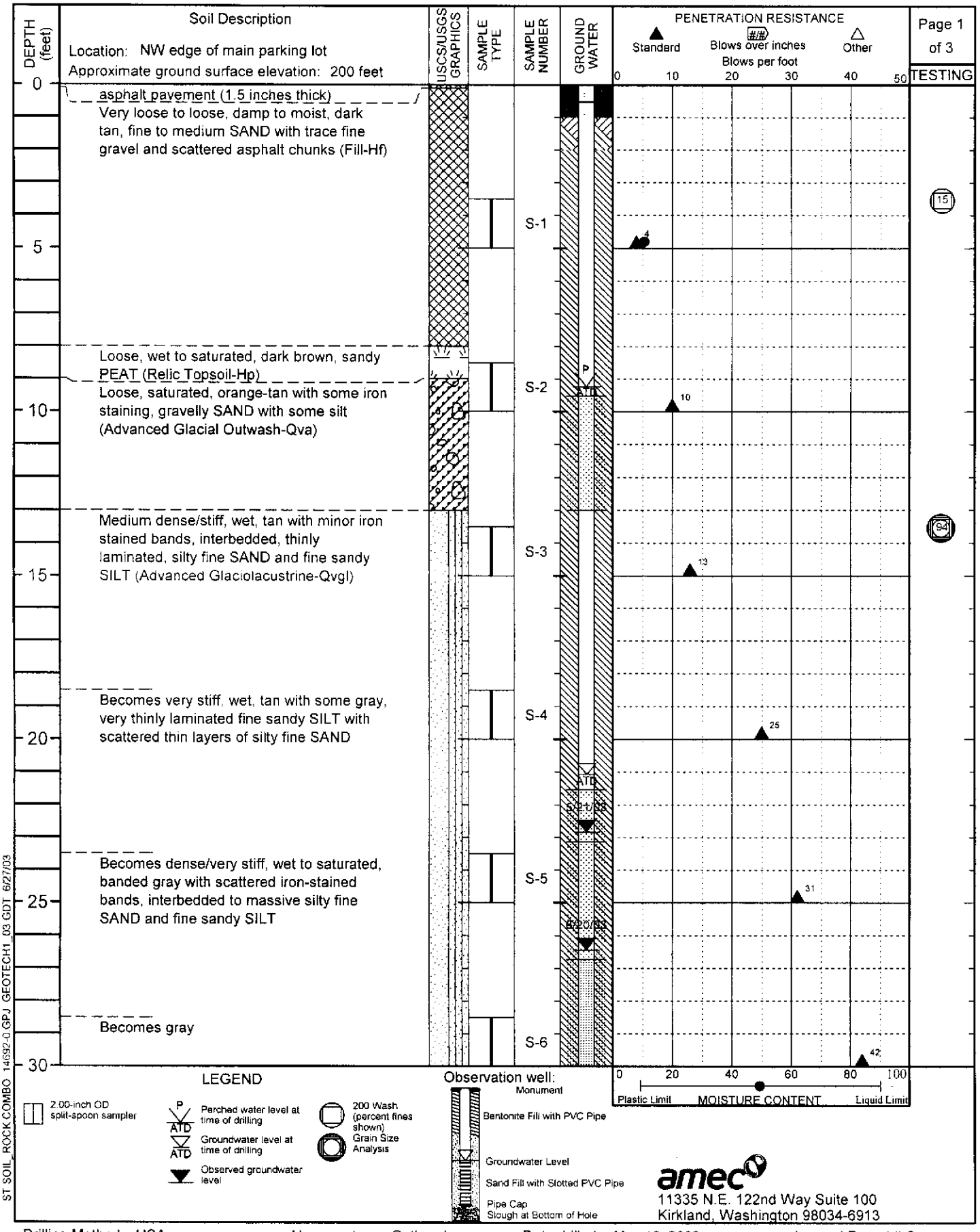
The enclosed *Boring Logs* describe the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted.

Well Installation Procedures

Our groundwater observation wells consist of 2-inch-diameter PVC pipe, the lower ten feet of which is finely slotted. The annular space around the slotted segment was backfilled with clean sand and gravel, and the upper portion of annulus was sealed with bentonite chips and concrete. A flush-mounted monument was placed over the top of each wellhead for protection. The as-built configuration of each observation well is illustrated on the respective *Boring Log*. Our logs also

show any post-drilling groundwater levels measured in the wells, along with the date of measurement.

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-1*



amec
11335 N.E. 122nd Way Suite 100
Kirkland, Washington 98034-6913

Drilling Method: HSA Hammer type: Cathead Date drilled: *May 10, 2003* Logged By: *JdLC*

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-1*

Page 2 of 3

Location: NW edge of main parking lot
Approximate ground surface elevation: 200 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (▲ Standard, ## Blows over inches, △ Other; Blows per foot 0 10 20 30 40 50)	TESTING
30	Cuttings become sandier and very wet						
	Becomes very dense, laminated to massive, silty fine SAND			S-7		53	
35							
	4-inch-thick layer of silty fine SAND with numerous fine organics deformed laminations (soft sediment deformation)			S-8		72	
40							
	Becomes hard, saturated, gray, massive SILT with some fine sand			S-9		68	
45							
	Becomes very dense, saturated, gray, massive fine SAND with some silt			S-10		75	
50							
	Becomes massive to thinly laminated fine SAND with trace silt with trace muscovite flakes and scattered fine organics			S-11		74	
55							
60							

0 20 40 60 80 100
Plastic Limit — MOISTURE CONTENT — Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- P ATD — Perched water level at time of drilling
- ATD — Groundwater level at time of drilling
- Observed groundwater level
- 200 Wash (percent fines shown)
- Grain Size Analysis

Observation well:
- Monument
- Bentonite Fill with PVC Pipe
- Groundwater Level
- Sand Fill with Slotted PVC Pipe
- Pipe Cap
- Slough at Bottom of Hole

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Drilling Method: HSA Hammer type: Cathead Date drilled: *May 10, 2003* Logged By: *JdLC*

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-1*

Soil Description

Location: NW edge of main parking lot

Approximate ground surface elevation: 200 feet

DEPTH (feet) | USCS/USGS GRAPHICS | SAMPLE TYPE | SAMPLE NUMBER | GROUND WATER | PENETRATION RESISTANCE (▲ Standard, ⟨##⟩ Blows over inches, △ Other; Blows per foot 0 10 20 30 40 50) | Page 3 of 3 | TESTING

60 — Becomes very dense/hard, saturated, gray, massive to thinly laminated, interbedded silty fine SAND and fine sandy SILT with trace muscovite flakes and scattered fine organics — S-12 — 50/3

Boring terminated at 61.5 feet below existing ground surface

65 70 75 80 85 90

MOISTURE CONTENT: 0 20 40 60 80 100 — Plastic Limit — Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- P ATD — Perched water level at time of drilling
- ATD — Groundwater level at time of drilling
- Observed groundwater level
- 200 Wash (percent fines shown)
- Grain Size Analysis

Observation well: Monument; Bentonite Fill with PVC Pipe; Groundwater Level; Sand Fill with Slotted PVC Pipe; Pipe Cap; Slough at Bottom of Hole

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Kirkland, Washington 98034-6913

Drilling Method: HSA Hammer type: Cathead Date drilled: *May 10, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-2*

Soil Description

Location: SW edge of upper parking lot

Approximate ground surface elevation: 217 feet

DEPTH (feet) | USCS/USGS GRAPHICS | SAMPLE TYPE | SAMPLE NUMBER | GROUND WATER | PENETRATION RESISTANCE (▲ Standard, #/# Blows over inches, △ Other; Blows per foot) | Page 1 of 2 | TESTING

0 asphalt pavement (1.5 inches thick)

Medium dense, damp to moist, tan with some iron stained bands, fine to medium SAND (Advance Glacial Outwash-Qva)

S-1 — 29

5

Becomes dense, damp, speckled tan, medium SAND

S-2 — 49

10

Becomes very dense, dry to damp, SAND with trace rounded gravel and silt

S-3 — 70

15

Becomes saturated, silty fine to medium SAND with scattered muscovite flakes

S-4 — 57

ATD

20

Hard, wet to saturated, tan and gray with minor iron staining, fine sandy SILT with scatterd silty fine SAND interbeds (Advanced Glaciolacustrine-Qvgl)

5/21/03

6/[illegible]/03

S-5 — 44

25

Becomes very dense/hard, wet, banded tan and gray with trace iron staining, interbedded, very thinly laminated silty fine SAND and fine sandy SILT

S-6 — 57

30

MOISTURE CONTENT: 0 20 40 60 80 100 — Plastic Limit — Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- ATD Groundwater level at time of drilling
- Observed groundwater level
- Grain Size Analysis

Observation well: Monument; Bentonite Fill with PVC Pipe; Groundwater Level; Sand Fill with Slotted PVC Pipe; Pipe Cap; Slough at Bottom of Hole

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Drilling Method: HSA Hammer type: Cathead Date drilled: *May 10, 2003* Logged By: *JdLC*

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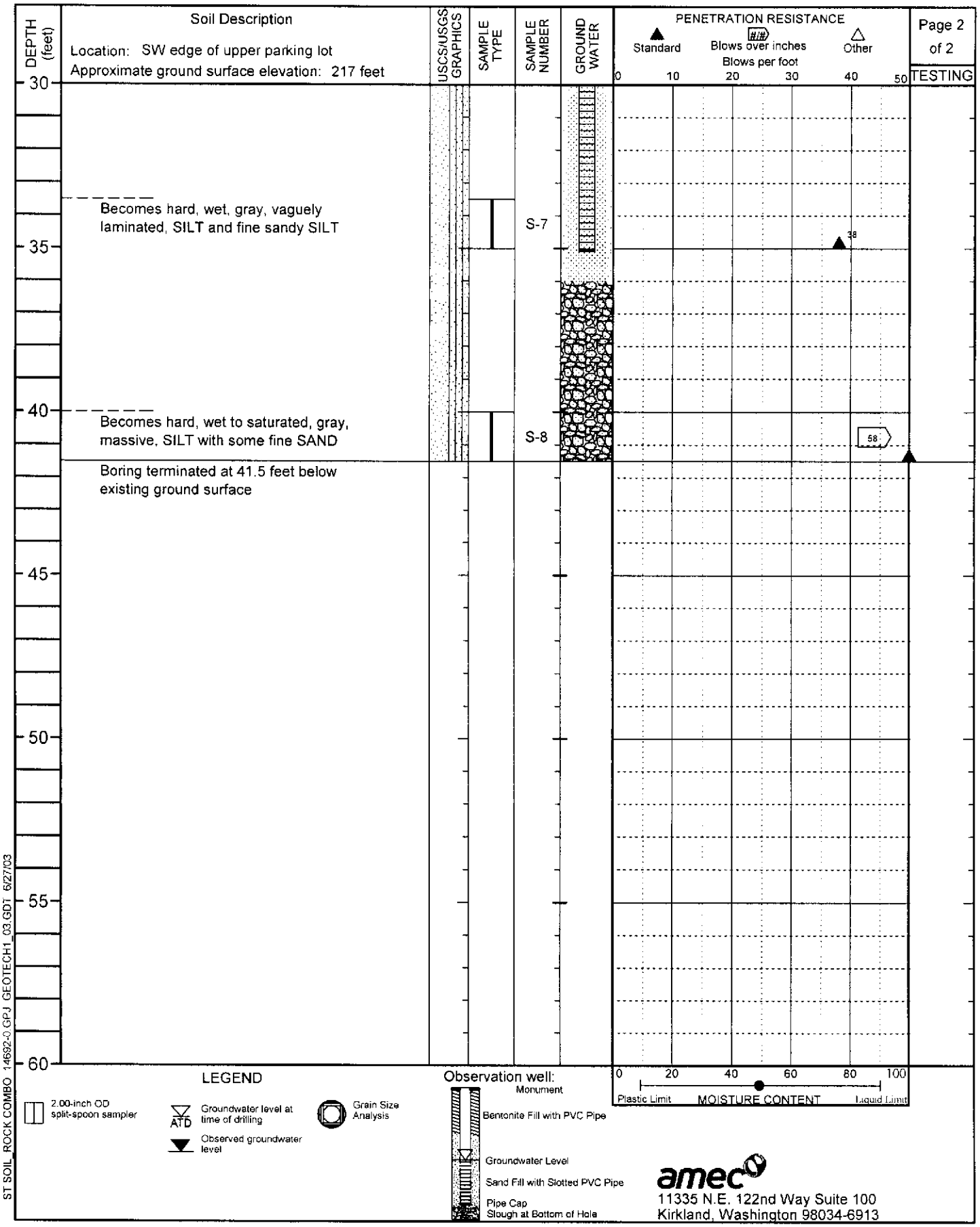
PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-2*



LEGEND

- 2.00-inch OD split-spoon sampler
- ATD Groundwater level at time of drilling
- Observed groundwater level
- Grain Size Analysis

Observation well:

- Monument
- Bentonite Fill with PVC Pipe
- Groundwater Level
- Sand Fill with Slotted PVC Pipe
- Pipe Cap
- Slough at Bottom of Hole

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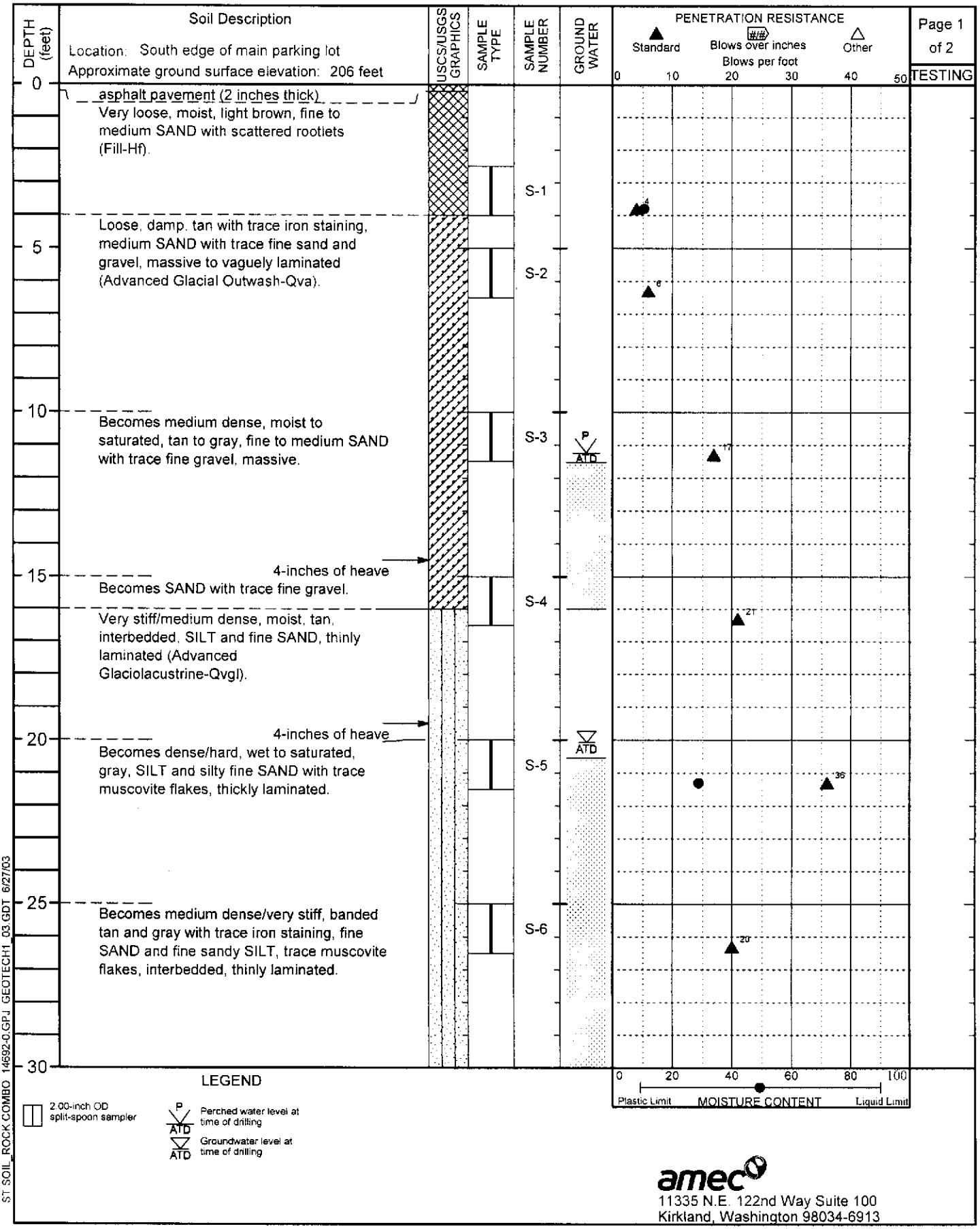
Drilling Method: HSA Hammer type: Cathead Date drilled: *May 10, 2003* Logged By: *JdLC*

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-3*



ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 16, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-3*

Soil Description

Location: South edge of main parking lot

Approximate ground surface elevation: 206 feet

DEPTH (feet) | USCS/USGS GRAPHICS | SAMPLE TYPE | SAMPLE NUMBER | GROUND WATER | PENETRATION RESISTANCE | Page 2 of 2 | TESTING

PENETRATION RESISTANCE: ▲ Standard; ## Blows over inches; △ Other; Blows per foot; 0 10 20 30 40 50

30

Becomes dense, tan-gray, fine SAND with some silt and trace muscovite flakes, vaguely laminated. — S-7 — 49

35

Becomes very dense, saturated, tan to gray, silty fine SAND, mostly massive. — S-8 — 50/5"

40

Becomes very dense/hard, wet to saturated, gray, silty fine SAND and SILT, thickly laminated. — S-9 — 64

Boring terminated at 41.5 feet below existing ground surface.

45

50

55

60

0 20 40 60 80 100

Plastic Limit — MOISTURE CONTENT — Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

P ATD Perched water level at time of drilling

ATD Groundwater level at time of drilling

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 16, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-4*

Soil Description

Location: Top of retained slope

Approximate ground surface elevation: 229 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER
0	Very loose, damp to moist, tan, fine to medium SAND (Fill-Hf)				N/E
	Medium dense, damp, speckled tan, fine to medium SAND, massive (Advanced Glacial Outwash-Qva).				
5				S-1	
10				S-2	
15	Becomes dense.			S-3	
20	Becomes very dense, damp, speckled tan, fine to medium SAND with trace gravel, massive.			S-4	
	Boring terminated at 21.5 feet below existing ground surface.				
25					
30					

PENETRATION RESISTANCE

▲ Standard ⟨##⟩ Blows over inches △ Other

Blows per foot

0 10 20 30 40 50

S-1: 20

S-2: ● 23

S-3: 41

S-4: 60

Page 1 of 1

TESTING

0 20 40 60 80 100

Plastic Limit MOISTURE CONTENT Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

N/E No groundwater encountered

ST SOIL ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-5*

Location: North edge of lower parking lot
Approximate ground surface elevation: 175 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER
0	asphalt pavement (2-inches thick). Medium dense, damp, banded tan and gray, silty SAND with trace gravel and scattered construction debris (Fill-Hf).			S-1	
5	Dense, damp, mottled tan and gray, silty gravelly SAND, massive (Weathered Glacial Till-Qvt).			S-2	
	Becomes very dense, massive to vaguely laminated.			S-3	
10					
	Hard/very dense, moist, tan to gray with trace iron staining, fine sandy SILT and silty fine SAND, interbedded, massive to vaguely laminated (Advanced Glaciolacustrine-Qvgl).			S-4	
15					
	Becomes dense/hard, moist to wet, gray, silty fine SAND and fine sandy SILT and clayey SILT, interbedded, thinly laminated.			S-5	
20					ATD
	Becomes very dense/hard, wet to saturated, massive silty fine SAND with several very thin organic layers.			S-6	
25	Boring terminated at 25 feet existing ground surface.				
30					

PENETRATION RESISTANCE
▲ Standard (#/#) Blows over inches △ Other
Blows per foot
0 10 20 30 40 50

Page 1 of 1

TESTING

27
38
50/6"
57
50
73

0 20 40 60 80 100
Plastic Limit MOISTURE CONTENT Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

ATD Groundwater level at time of drilling

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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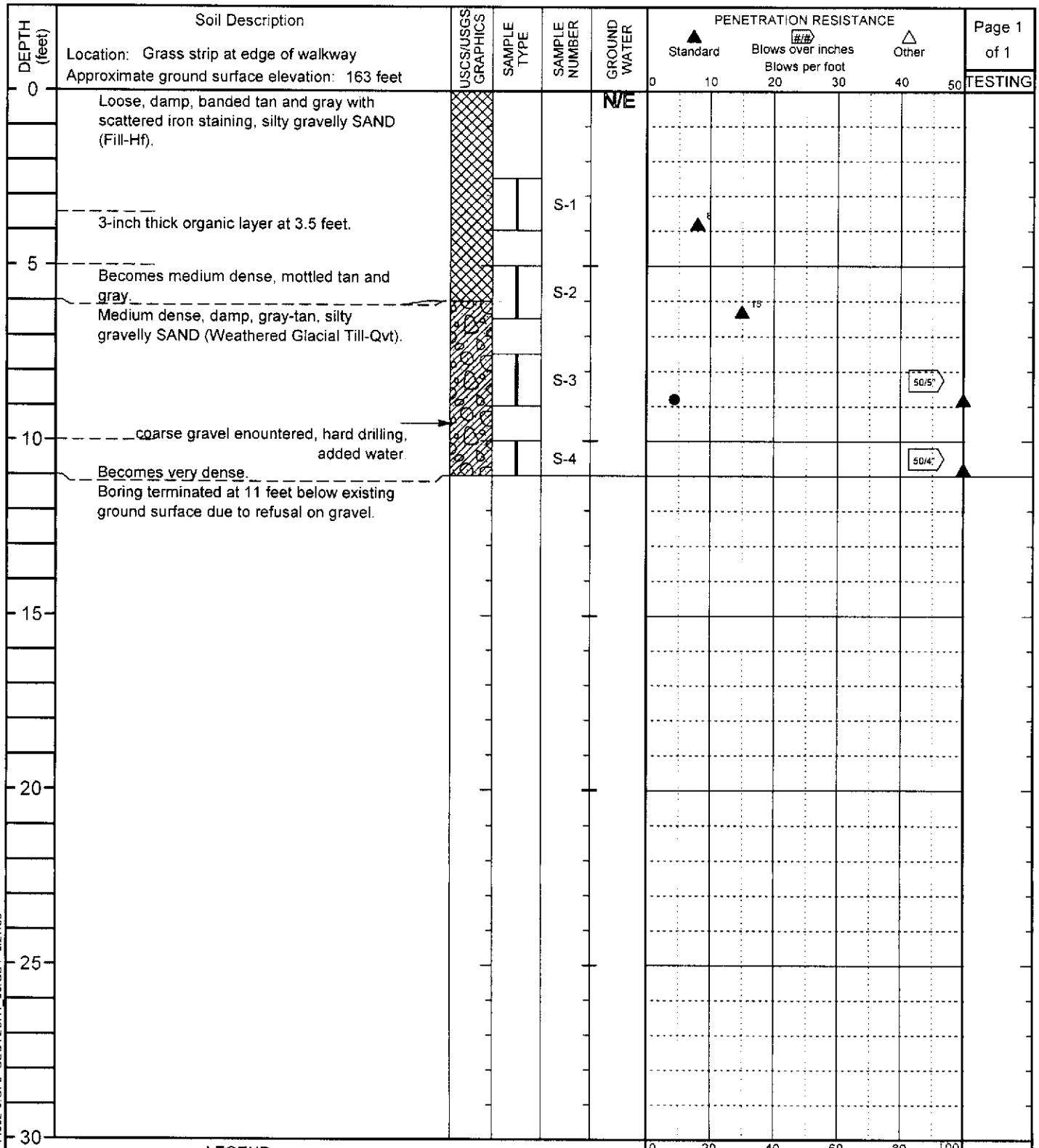
Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-6*



ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-7*

Soil Description

Location: Top of retaining wall

Approximate ground surface elevation: 173 feet

DEPTH (feet)

USCS/USGS GRAPHICS

SAMPLE TYPE

SAMPLE NUMBER

GROUND WATER

PENETRATION RESISTANCE

▲ Standard ##/## Blows over inches △ Other

Blows per foot

Page 1 of 1

TESTING

0 Very loose, dry, tan, fine to medium SAND (Fill-Hf).

S-1

5

10 Becomes loose. wet, mix of tan and gray with some iron staining, silty SAND with some gravel.

S-2

Dense, wet to saturated, banded tan and gray, massive silty gravelly SAND with scattered beds of silty fine SAND (Weathered Glacial Till-Qvt).

becomes gravelly, hard drilling, added water

15

S-3

ATD

Dense, gray with some tan, silty fine SAND, mostly massive (Advanced Glaciolacustrine-Qvgl).

20

S-4

Boring terminated at 21.5 feet below existing ground surface.

25

30

LEGEND

2.00-inch OD split-spoon sampler

ATD Groundwater level at time of drilling

0 20 40 60 80 100

Plastic Limit MOISTURE CONTENT Liquid Limit

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/2/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 16, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-8*

Soil Description

Location: Grass at SW corner of house.

Approximate ground surface elevation: 179 feet

Very loose, damp, tan, fine SAND (Fill-Hf).

Medium dense, damp to moist, gray with iron stained mottling, silty gravelly SAND, massive (Weathered Glacial Till-Qvt).

Medium dense/stiff, moist to wet, gray to tan, fine SAND and fine sandy SILT, vaguely banded (Advanced Glaciolacustrine-Qvgl).

Becomes hard, moist, gray, massive SILT with trace thin sand seams.

Becomes dense, wet to saturated, gray, silty fine SAND, vaguelly banded.

Becomes hard, dark gray, SILT, mostly massive.

Boaring terminated at 21.5 feet below existing ground surface.

DEPTH (feet): 0, 5, 10, 15, 20, 25, 30

USCS/USGS GRAPHICS

SAMPLE TYPE

SAMPLE NUMBER: S-1, S-2, S-3, S-4, S-5

GROUND WATER: ATD

PENETRATION RESISTANCE

▲ Standard ▣ Blows over inches Blows per foot △ Other

0 10 20 30 40 50

Page 1 of 1

TESTING: 40

Standard penetration values: 18, 14, 30, 42, 41

MOISTURE CONTENT: 0 20 40 60 80 100; Plastic Limit — Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

ATD Groundwater level at time of drilling

200 Wash (percent fines shown)

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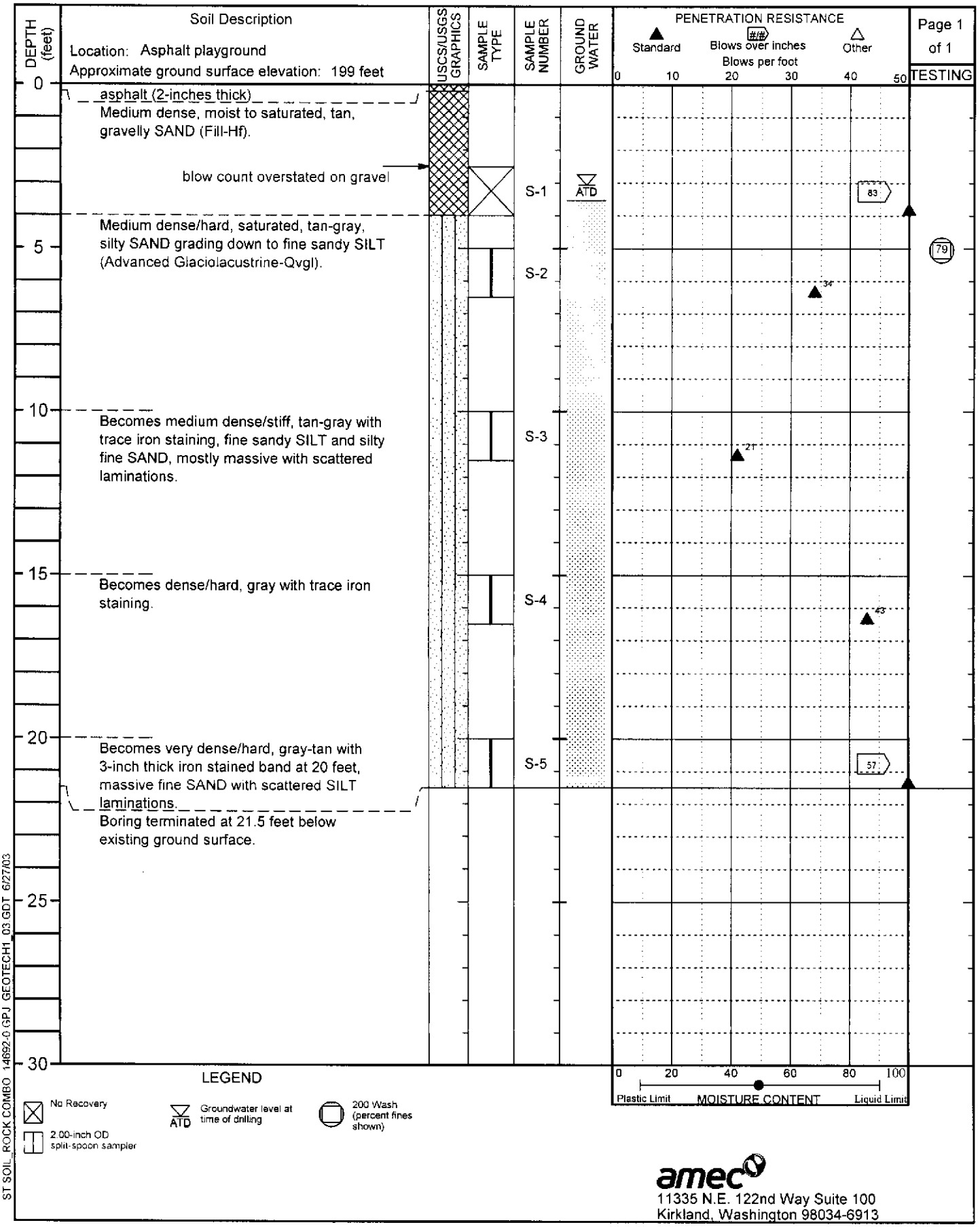
Drilling Method: HSA Hammer type: Cathead Date drilled: *June 16, 2003* Logged By: *JdLC*

ST SOIL_ROCK COMBO 1469;. 0.GPJ GEOTECH1_03.GDT 6/27/03

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-9*



ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1_03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-10*

Soil/Rock Description

Location: top of slope

Approximate ground surface elevation: 186 feet

Loose, damp to moist, light brown, fine to medium SAND with some gravel (Fill-Hf).

Loose, damp, tan with thin bands of iron staining, fine to medium SAND, vaguely laminated (Advanced Glacial Outwash-Qvgl).

Becomes loose to medium dense, massive.

Stiff, moist, tan with trace iron staining, SILT, thinly laminated (Advanced Glaciolacustrine-Qvgl)

Becomes loose/medium stiff, moist to wet, tan with scattered thin oxidation bands, silty fine SAND and SILT and fine sandy SILT, interbedded, thinly laminated.

Becomes medium dense, wet to saturated, tan-gray grading to gray with well developed iron stained layer, fine SAND and silty fine SAND with trace layer of fine to medium SAND, interbedded.

Becomes medium dense/very stiff, gray.

Approximate top of aquatard.

Becomes dense/hard, moist, gray, fine sandy silt with scattered layers of silty fine SAND with very thin lamina of fine organics, thinly to thickly laminated

DEPTH (feet): 0, 5, 10, 15, 20, 25, 30

USCS/USGS GRAPHICS

SAMPLE TYPE

SAMPLE NUMBER: S-1, S-2, S-3, S-4, S-5, S-6

GROUND WATER: P ATD 8/17/03

PENETRATION RESISTANCE

Standard ▲ Blows over inches (##) Other △

Blows per foot

0 10 20 30 40 50

Page 1 of 2

TESTING

S-1: 5

S-2: 11

S-3: 8

S-4: 29

S-5: 20

S-6: 36

94

0 20 40 60 80 100

Plastic Limit MOISTURE CONTENT Liquid Limit

ROCK QUALITY DESIGNATION

LEGEND

2.00-inch OD split-spoon sampler

P ATD Perched water level at time of drilling

ATD Groundwater level at time of drilling

200 Wash (percent fines shown)

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

ST SOIL_ROCK COMBO 14692-0 GPJ GEOTECH1_03.GDT 6/27/03

PROJECT: *Seattle Country Day School* JOB No. *1-91M-14692-0* BORING No. *B-10*

DEPTH (feet)	Soil/Rock Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (▲ Standard, #/# Blows over inches, △ Other; Blows per foot 0 10 20 30 40 50)	Page 2 of 2 TESTING
30	Location: top of slope Approximate ground surface elevation: 186 feet Approximate bottom of aquatard.				ATD 6/17/03		
	Becomes medium dense, saturated, gray, silty fine SAND, thinly to thickly laminated.			S-7		▲ 17	
35							
	Becomes very dense, saturated, gray, fine SAND, massive.			S-8		53	
	Boring terminated at 39 feet below exsiting ground surface.						
40							
45							
50							
55							
60							

LEGEND

- 2.00-inch OD split-spoon sampler
- P ATD — Perched water level at time of drilling
- ATD — Groundwater level at time of drilling
- 200 Wash (percent fines shown)

0 20 40 60 80 100
Plastic Limit — MOISTURE CONTENT — Liquid Limit

◆ ROCK QUALITY DESIGNATION

ST SOIL_ROCK COMBO 14692-0.GPJ GEOTECH1 03.GDT 6/27/03

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Drilling Method: HSA Hammer type: Cathead Date drilled: *June 17, 2003* Logged By: *JdLC*

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

APPENDIX B
LABORATORY TESTING PROCEDURES AND RESULTS
3-91M-14692-0

The following paragraphs describe our procedures associated with the laboratory tests that we conducted for this project. Graphical results of certain laboratory tests are enclosed in this appendix.

Visual Classification Procedures

Visual soil classifications were conducted on all samples in the field and on selected samples in our laboratory. All soils were classified in general accordance with the United Soil Classification System, which includes color, relative moisture content, primary soil type (based on grain size), and any accessory soil types. The resulting soil classifications are presented on the exploration logs contained in Appendix A.

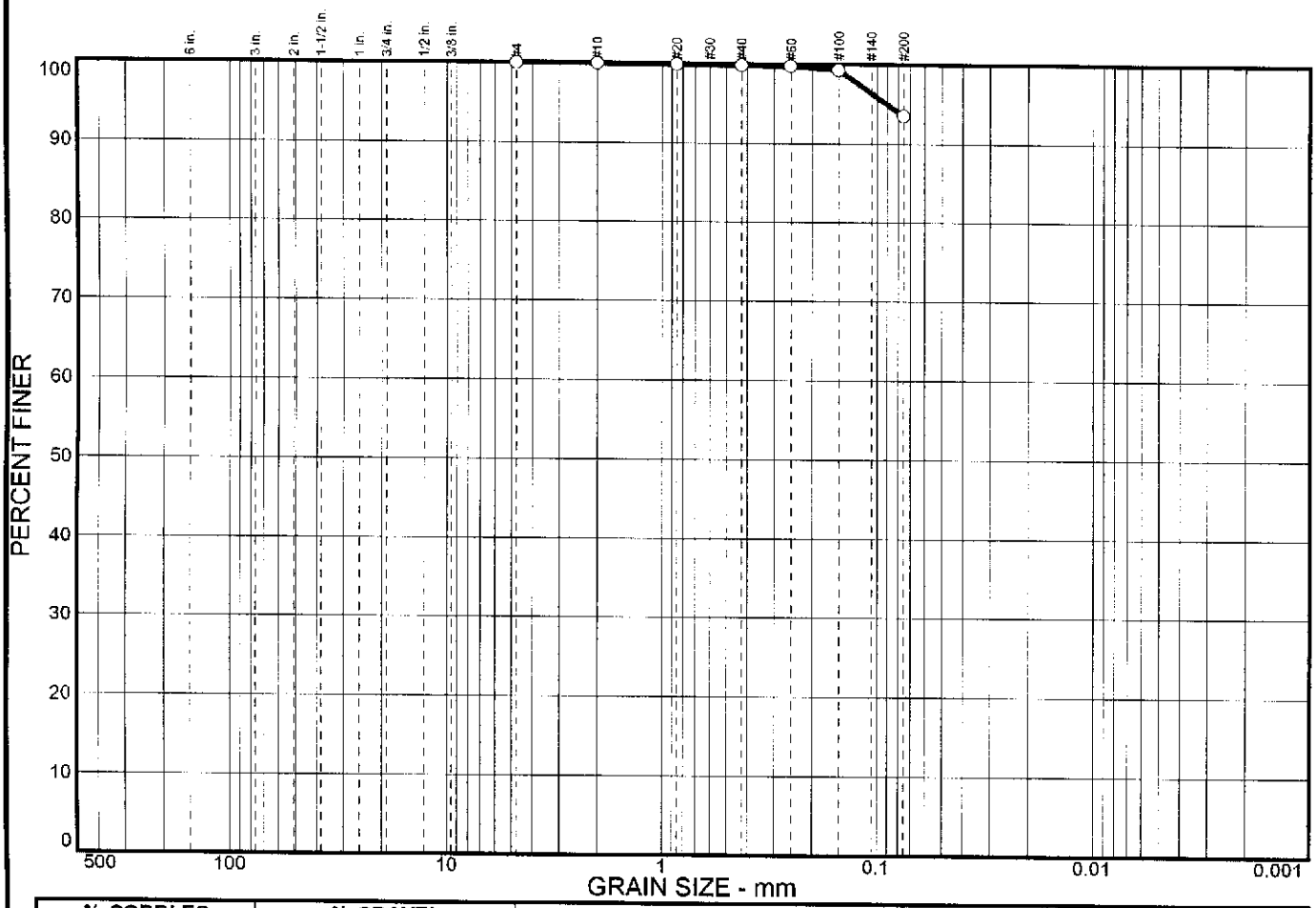
Moisture Content Determination Procedures

Moisture content determinations were performed on representative samples to aid in identification and correlation of soil types. All determinations were made in general accordance with ASTM:D-2216. The results of these tests are shown on the exploration logs contained in Appendix A.

Grain Size Analysis Procedures

A grain size analysis indicates the range of soil particle diameters included in a particular sample. Grain size analyses were performed on representative samples in general accordance with ASTM:D-422. The results of these tests are presented on the enclosed grain-size distribution graphs and were used in soil classifications shown on the exploration logs contained in Appendix A.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	6.5	93.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.7		
#100	99.3		
#200	93.5		

* (no specification provided)

Soil Description

Olive gray fines
Moisture=28.7%

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Tested by: YY, RM Reviewed by: SMS
ASTM: C136-96a, D1140-97, D2217-96
Sampled: 6/17/03 jdlc

Sample No.: 5605.1 **Source of Sample:** **Date:** 6/25/03
Location: B-1, S-3 **Elev./Depth:** 13.5'

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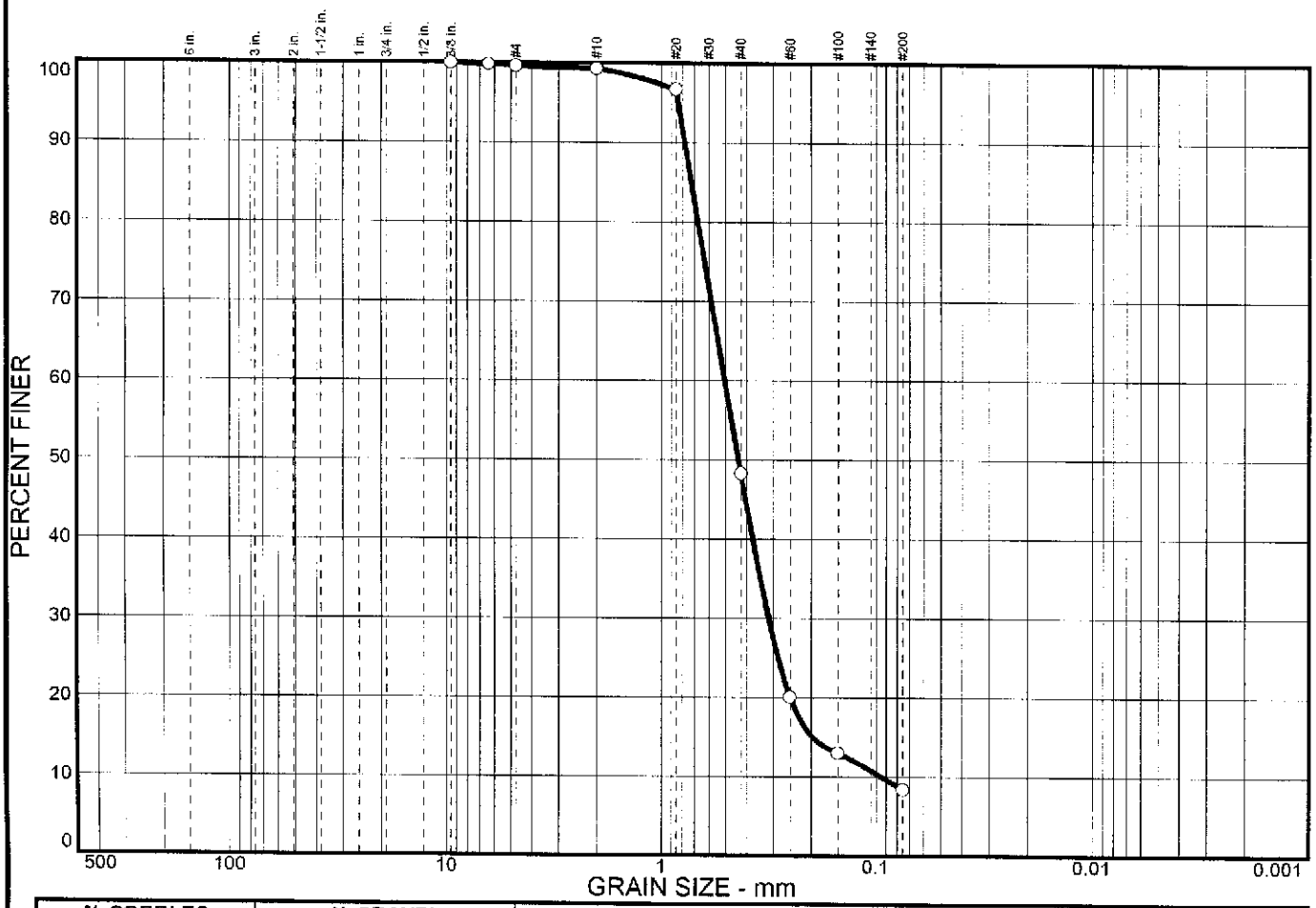
Client: Seattle Country Day School
Project: Seattle Country Day School

Project No: 391M146920 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.4	91.2	8.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
1/4 in.	99.8		
#4	99.6		
#10	99.3		
#20	96.7		
#40	48.3		
#60	20.1		
#100	13.0		
#200	8.4		

* (no specification provided)

Soil Description

Olive gray sand with fines
Moisture=15.8%

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.721 D_{60}= 0.506 D_{50}= 0.436
D_{30}= 0.314 D_{15}= 0.196 D_{10}= 0.0937
C_u= 5.39 C_c= 2.09

Classification

USCS= SP-SM AASHTO=

Remarks

Tested by: RM, YY Reviewed by: SMS
ASTM: C136-96a, D1140-97, D2217-96
Sampled: 6/17/03 jdlc

Sample No.: 5605.2 **Source of Sample:** **Date:** 6/25/03
Location: B-2, S-1 **Elev./Depth:** 3.5'

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Client: Seattle Country Day School
Project: Seattle Country Day School

Project No: 391M146920 **Plate**

MOISTURE CONTENT AND MINUS 200 WASH

ASTM: D2216-92, D1140-97

Job Name: Seattle Country Day School
Job Number: 3-91M-14692-0
Date: 6/23/03

Client: Seattle Country Day School
Sample Date: 5/10-6/17/03
Sampled By: JDLC

ID Number:	5605.3	5605.4	5605.5	5605.6	5605.7	5605.8	5605.9	5605.10	5605.11	5605.12
Exploration:	B-1	B-8	B-9	B-10	B-2	B-1	B-3	B-3	B-4	B-5
Sample Number:	S-1	S-1	S-2	S-3	S-3	S-4	S-1	S-5	S-2	S-3
Depth:	3.5'	2.5'	5'	12.5'	13.5'	18.5'	2.5'	20.0'	10.0'	8.5'
Sample Description:	Olive gray silty gravelly sand	Olive gray silty gravelly sand	Olive gray sandy fines	Olive gray fines	Olive gray silty sand	Olive gray silty fine sand	Dark brown silty fine sand	Olive gray silty fine sand	Olive gray silty sand	Olive gray silty sand
Wet sample + tare:	588.8	800.9	545.7	718.6	522.4	954.7	411.3	1004.8	954.6	1065.0
Dry sample + tare:	554.7	734.0	474.1	603.0	505.4	775.3	387.5	817.1	888.2	996.6
Water:	34.1	66.9	71.6	115.6	17.0	179.4	23.8	187.7	66.4	68.4
Tare:	222.7	221.6	220.9	217.8	84.1	155.6	163.0	164.8	157.0	156.5
Moisture Content:	10.3%	13.1%	28.3%	30.0%	4.0%	28.9%	10.6%	28.8%	9.1%	8.1%
Washed sample + tare	505.0	527.0	273.8	240.0						
% -200 Wash	14.97%	40.4%	79.1%	94.2%						

ID Number:	5605.13	5605.14	5605.15	5605.16						
Exploration:	B-6	B-7	B-8	B-10						
Sample Number:	S-3	S-3	S-3	S-6						
Depth:	7.5'	15.0'	10.0'	27.5'						
Sample Description:	Olive gray silty sand	Olive gray silty fine sand	Dark gray fines	Dark gray fines						
Wet sample + tare:	668.9	895.6	792.3	1409.1						
Dry sample + tare:	627.6	754.9	654.4	1148.7						
Water:	41.3	140.7	137.9	260.4						
Tare:	156.7	163.0	160.5	156.3						
Moisture Content:	8.8%	23.8%	27.9%	26.2%						

Reviewed by: SMS

Appendix B – Administrative Conditional Use and Variance Applications as Submitted by Seattle Country Day School

CITY OF SEATTLE

Application Form for Administrative Conditional Use in Residential Zones

NOTE: This form has been completed by SCDS. It has not been edited or modified by DPD

Seattle Country Day School
2619 4th Avenue North
DCLU Project Number: 2302435

GENERAL DESCRIPTION

1. What type of conditional use are you requesting?

Institution.

2. Is the proposal a new use? Or an expansion of an existing use?

Expansion of an existing use.

If this is a new use, what is the existing use of the site or structure?

N/A

3. Describe the proposed project including square footage of the structure, height (1, 2, 3 stories, etc.) and other specific details that, with the plans explains the nature of the proposed development.

The proposed project is construction of two new 2-3 story academic buildings, parking areas and associated sitework, and renovation of existing structures at an existing K-8 independent school. The project will likely be constructed in two phases with up to 4 to 10 years between phases. A Master Use Permit is being sought for both phases. Although the timing of phase II is not yet certain, it is included in the Master Use Permit in order to facilitate a comprehensive review of the School's development plans.

The school will increase in size from approximately 43,000 SF of classroom and administrative space to 77,000 SF at the end of the phase II, plus a 10,000 SF parking garage. The size is currently zoned SF-5000 and L-1. There is no expansion of the school's boundaries.

The project goals are to improve and enhance the educational facilities at the school and to address traffic and parking issues for the school and neighborhood. The curriculum is currently constrained by space limitations and outdated facilities. The phase I scope includes creation of a new building for the middle-school students (grades 6-8), renovation of other facilities, new parking and playfield, addition of a new private drive for improved student pickup and dropoff operations, and street improvement of the end of Nob Hill Avenue North. The phase II scope includes an approximately 29-car parking garage, a new building housing administration and improved classroom space for the K-5 grades, and relocation of the playfield constructed in phase I.

Five residential structures, one residential garage, and one existing school building will be demolished under this proposal. Of the five residences to be demolished, three are rental residences owned by the school and two are for school uses. One residential structure will remain on the site and will be converted to school uses. Keeping this structure will require a variance for lot coverage in phase II.

4. If the proposed development is an institution, how many clients, students, employees, or residents will be using the facility? What hours of operation, types of programs, etc. are planned for the proposed development?

SCDS student enrollment could increase from 303 to 328 and faculty/staff could increase from 56 to 61 in the future with or without the proposed project. No increases in student enrollment or faculty/staff are anticipated due to the development proposal. Most faculty, staff and students arrive on campus between 7:30 am and 8:30 am on school days. The school day begins at 8:15 am and 8:30 am for the middle and lower schools, respectively. Pickup occurs between 2:50 pm and 3:10 pm. Some children participate in an extended-day program at SCDS. The program operates between 7:30 and 8:30 am and between 2:50 pm and 6:00 pm when school is in session. Approximately 20 students participate in the before-school program and about 55 students in the after-school program. Staff generally depart between 3:30 and 4:00 pm.

Institution Uses in Single Family Zones

Land Use Code Section: 23.44.022

Development in the SF-5000 zone includes the Phase I building (Bldg 4 – the New Middle School), a portion of the phase II building (Bldg 5 – the new Classroom/Administration Building), a portion of the new private drive, surface parking, and the playfield. Three residential structures and one residential garage will be demolished. One residential structure will be converted to school use. Retaining this structure in phase II will require a variance.

1. Dispersion

1.a. Does your proposal meet the following dispersion criterion?
The lot line is located 600 feet or more from any lot line of any other institution in a residential zone.

To the best of our knowledge, Seattle Country Day School meets this criterion.

1.b. If your proposal does not meet dispersion as described above, describe how it meets one or more of the following exceptions:

N/A

1.c. Your plans should graphically show the dispersion characteristics (i.e. the distance of any other institutions from the proposal) as described in the application instructions.

N/A

2. Demolition of Residential Structures

2.a. Does your proposal meet the following criterion?
No residential structure shall be demolished nor shall its use be changed to provide for institutional parking.

No. Surface parking will be constructed on the site of an existing residential structure.

2.b. If your proposal does not meet the above criterion, describe how it meets the following exception.
If the demolition or change of use is necessary to meet the parking requirements of the Land Use Code and if alternative locations would have greater noise, odor, light and glare or traffic impacts on surrounding property in residential use, the Director may permit the parking. The Director may also consider waiver of parking requirements in order to preserve the residential structure and/or use. The waiver may include, but is not limited to, a reduction in the number of required parking spaces and a waiver of parking development standards such as location or screening.

The SCDS property includes 4 existing residential structures in the SF zone. In this proposal, three of these structures are removed and one undergoes a change of use to school uses. The parcels of the three structures that are removed are turned into a combination of surface parking, vehicular access, playfield, landscape area, and portions of a new classroom and administrative building over parking garage. The location of the surface parking resulted from careful consideration of the overall campus development vis-à-vis the neighborhood and was not specifically targeted for the parcel with the residential structure(s).

The surface parking in the area of the three structures to be demolished is required for two reasons. First, it replaces the surface parking that is demolished during construction of the new building (building #4) on the southeastern portion of the site. Second, it is needed to increase the amount of parking for the institution in order to meet code requirements. In general, the design intent was to concentrate the new building structures – and their bulk - on the part of the site away from the main residential area to the north, and to use the sitework and landscaping to buffer the school facilities from the main residential area to the north.

3. Noise and Odors

3.a. Describe how the institution will operate in compliance with the Noise Ordinance, Chapter 25.08.

The project is an expansion of an existing school use. There is potential for a small increase in student enrollment and staffing with or without the project. As a result, the noise generated by school operations should remain the same or only slightly increased from the existing noise levels. These noise levels will need to comply with sections 25.08.400 to 420. Noise generated during construction will need to comply with section 25.08.425.

The main sources of noise resulting from school operations will need to comply with the Noise Ordinance as follows:

Motor Vehicles: Staff and parent vehicle operations will need to comply with Section 25.08.430 to 480.

Building Operation and Students: Building equipment operation and student activities will need to comply with Subchapter V.

To the best of our knowledge, the school currently operates within the limits allowed by the noise ordinance. In the past, noise generated by student activities and building operations, as well as automotive traffic, has not been a complaint. SCDS has taken the following steps to address other noise problems as follows:

1. *Trash pickup: Pickup is schedule for Saturdays between 8 am and Noon so that pickup does not interfere with school activities or occur before 7am on weekdays.*
2. *Morning extended day care: This program was moved from the gymnasium to the lunchroom to better enclose the noise produced by students in this program.*

3.b. In addition to adjustments to the location of the institution on the lot, describe any mitigation provided for potential noise and odor impacts from the following (if applicable):

- on-site parking and vehicular circulation
- outdoor recreational areas

- trash and refuse storage areas
- ventilating mechanisms
- sports facilities and other noise-generating and odor-generating equipment
- fixtures or facilities.

Within the site, the buildings are consolidated towards the center of the site and along 4th Avenue North to contain and internalize noise generated by typical daily school activities. In addition, the buildings are located to allow a new on-site access drive designed to reduce traffic queuing on surrounding residential streets.

On-site parking and vehicle operation: Surface parking and access drives at the north side of the property are screened from adjoining properties to the north with fencing and plantings. In phase 2, the surface parking in the SF zone is replaced with a covered parking garage which will contain the noise and odor. In addition, retaining the residence (Building 8) will screen the driveway from properties to the north. Overall traffic generation and the amount of parking in the neighborhood will not increase with this proposal. However, the new site plan will internalize vehicle traffic and parking within the site to a much greater degree than the existing condition. This will help mitigate noise and odor impacts.

Outdoor recreational areas: The playground at the southern side of the site is existing. It is screened from adjoining properties to the south by the densely vegetated hillside and the steep grade. The playfield at the northern side of the property will be new – the location will change from phase I to phase II. In either location, it will be screened from adjoining properties with fencing and planting.

Trash and refuse storage areas: In phase I, the trash area is located in the surface parking area at the northwestern part of the site. It is screened from the adjacent property to the north with fencing and planting. In phase II, the trash area is in the parking garage. It will need to be wheeled out for pickup but the area for the pickup is screened from the properties to the north by plantings and the residential structure to be retained (Building 8). Scheduling of trash pickup will likely remain the same as the current plan.

Ventilating mechanisms: Ventilating mechanisms on the existing facilities will not be changed significantly. The design of the new buildings seeks to minimize the number of ventilating mechanisms. The buildings will rely primarily on natural ventilation through operable windows and skylights. There will be minimal numbers of rooftop exhaust fans to ventilate restrooms and selected other spaces.

4. Landscaping

4.a. Describe how landscaping is used to:

- integrate the institution with adjacent areas
- reduce the potential for erosion or extensive stormwater runoff
- reduce the coverage of the site by impervious surfaces
- screen parking from adjacent residentially zoned lots or streets
- reduce the appearance of bulk of the institution

New landscaping will include a variety of trees, shrubs and groundcover providing shade, scale and screening of the campus buildings. Plantings will be selected to offer seasonal color and texture. At least 25% of the planting will be drought tolerant. Selected species will include a combination of native and ornamental plants. Planting areas will be well planted so that complete coverage can be achieved in 3

years to prevent soil erosion and lesson storm water runoff. Parking will be screened with a combination of shrubs and vines growing on fencing.

4.b. Describe how landscaping plant materials are species compatible with surrounding flora.

Surrounding flora is a combination of native and ornamental plants. New plantings for the project will also be a combination of native and ornamental plants.

4.c. What existing plant material will be retained? Describe the long term maintenance plan for landscaped areas.

Existing plant material that will be retained includes lawn and other groundcover, shrubs, and large and small trees. The long-term maintenance plan is to continue the existing program for maintenance.

5. Light and Glare

5.a. Describe how exterior lighting will be shielded or directed away from adjacent residentially zoned lots. What is the area, angle, and intensity of the illumination?

The exterior lighting will illuminate parking lots, exterior walkways and stairs without creating light spill into the adjacent neighborhood. All exterior lighting will be full cut-off type producing less than 10% candela between 80 and 90 degrees vertical illumination and will be limited to areas that need to be lighted for safety and security. Horizontal light levels for exterior fixtures will meet IESNA's Zone II illuminance levels for urban residential areas. There will not be any fixtures aimed up into the night sky. None of the building facades will be illuminated. None of the lighting will extend beyond the property line.

5.b. Identify mitigation, such as nonreflective surfaces which will be used to help reduce glare.

Building wall surfaces will generally be non-reflective, and will be primarily masonry and painted siding. There may be pre-finished metal panels and trim but the treatment will be paint with a low level of reflectance. Landscaping will further mitigate any glare.

6. Bulk and Siting

6.a. Lot Area. Is the site more than 1 acre in size? If yes, please answer the following:

Yes. The lot area in the SF5000 zone is 1.83 acres.

6.a(1) For lots with unusual configuration or uneven boundaries, are the proposed principal structures located so that changes in potential and existing development patterns on the block or blocks within which the institution is located are kept to a minimum?

Yes. New structures are located away from the north perimeter of the property to avoid impact on adjacent properties from the height and bulk of the buildings. The adjacent properties to the south are elevated far above the school and are generally not impacted by the bulk of the new buildings.

6.a(2) For lots with large street frontage in relationship to their size, does the proposed institution reflect design and architectural features associated with adjacent residentially zoned block faces and provide continuity of the block front and provide integration with residential structures and uses in the immediate area?

Yes. New structures with frontages along 4th Avenue North and Nob Hill Avenue North are designed to reflect the design and architectural features of adjacent properties. The buildings reflect existing setbacks. The buildings use gabled elements of similar scale to the adjacent structures to break up the building facades. The building facades have materials similar to those on the existing residential structures, and also incorporate masonry elements to blend with the existing main school building.

6.b. Yards. Do the yards meet the following development standards?

6.b(1) Single family development standards and no structure other than freestanding walls, fences, bulkheads or similar structures are closer than 10 feet to the side lot line.

New structures meet single family development standards and the 10-foot standard to the side lot line. Two existing structures do not meet those standards. These structures are the gymnasium building (Building 2) and the residential structure to remain (Building 8). The residential structure to remain will be converted to school use.

6.c. If the proposed institution does not meet the above standards, the following criteria may be applied:

6.c(1) Existing structures which do not meet yard requirements may be permitted to convert to institution use, provided that the Director may require additional mitigating measures to reduce impacts of the proposed use on surrounding properties.

6.c(2) The yards may be reduced to a minimum of 5 feet if the possible noise, odor, comparative scale or other similar impacts can be mitigated.

6.c(3) Describe the demonstrable public benefit of a reduced yard (less than 10' – but not less than 5').

The residential structure to remain and be converted to school use (Building 8) has an existing side yard of approximately 7 feet 6 inches and an existing front yard of approximately 15 feet. The proposal is to convert the use but keep the building virtually unchanged in terms of architecture and landscaping. This will keep that portion of the site in scale with the existing residential neighborhood and no additional mitigation should be necessary.

6.d. Religious Symbols. Is there a religious symbol and portion of the roof supporting it, which extends up to 25 feet above the height limit?

No.

6.e. Façade Scale. If any proposed façade exceeds 30 feet in length, what design features such as modulation, architectural features, landscaping or increased yards, have been used to minimize the appearance of the bulk?

All new structures have façades that exceed 30 feet in length in the SF zone but all are designed to minimize the appearance of bulk.

For the new structure constructed in phase I (Building 4), the design includes 1) modulation, 2) architectural features such as gabled elements, overhangs, and varied materials, 3) landscaping, and 4) increased yards to minimize the appearance of the bulk. The total façade length is about 110 feet on the east elevation.

For the portions of the new structure constructed in the SF zone in phase II (Building 5), the design includes the same type of modulation, architectural features, and landscaping. The total façade length in the SF zone is 52 feet on the north elevation and 55 feet on the west elevation.

7. Parking and Loading Berth Requirements

7.a. What are the estimated demands for parking and loading for the proposed development?

Parking requirements to meet the land use code are 52 stalls at the end of Phase I and 59 stalls at the end of Phase II. Two loading areas are required. There are 29 stalls on site at present.

7.b. How do you propose to reduce the use of single occupancy vehicles?

7.b(1) Options – public transit, vanpools, carpools, and/or bicycles.

The number of trips generated by the school site is not expected to increase with the project and the overall number of trips generated by the school site is expected to decrease due to the three houses that would be demolished with the project, and the one house that would change from residential to school use. Since no increase in traffic volume is anticipated, there is no new impact to be mitigated.

However, to address existing neighborhood concerns, SCDS has voluntarily implemented a neighborhood transportation advisory committee to address operational issues related to drop-off and pick-up activities, parking, and special events. This committee will also evaluate possible improvements to enhance carpooling and reduce the number of trips generated by the school.

7.c. Are you requesting a modification of parking and loading requirements?

No. Parking and loading requirements are satisfied.

7.c(1) What would be the public benefit of the modification?

N/A

7.c(2) How much more traffic through residential streets would the modification cause

N/A

7.c(3) What safety hazards might the modification create?

N/A

8. Transportation Plan

A transportation plan will be required for new institutions or institutional additions of more than 4,000 sq. ft. or 20 or more parking spaces. The level of detail will be based on the probable impacts and/or scale of the institution. Please see Section 23.44.022M of the Land Use Code for components. Director's Rule #2-94 describes detailed information on Transportation Management Programs (TMPs) that may be applicable to your proposal.

Since the project would add more than four thousand (4,000) square feet of new building space and twenty (20) parking spaces, a transportation plan is required.

*A transportation plan has been prepared for this project and is attached (*Seattle Country Day School Development Proposal Transportation Analysis*, Heffron Transportation, Inc., August 4, 2003). The plan details the school's trip generation, on-site parking demand and supply, on-street parking characteristics in the vicinity of the school, and general operations.*

As described in the transportation plan, the number of trips generated by the school would decrease in the future with the project (due to the five demolished houses and change of use of one house), the existing afternoon peak on-street queue is anticipated to decrease dramatically (by approximately 20 vehicles) with the new private drive, and the on-street parking utilization is expected to decrease due to increased on-site parking. Therefore, the overall traffic condition near the school is expected to be improved with the development proposal and no additional transportation mitigation is suggested to accommodate the proposed plan.

However, to address existing neighborhood concerns, SCDS has voluntarily implemented a neighborhood transportation advisory committee to address operational issues related to student drop-off and pick-up activities, parking, and special events. In addition, SCDS proposes a contribution toward a Neighborhood Transportation Plan to address other transportation issues in the neighborhood including speeding, misaligned traffic circles, and cut-through traffic. No other transportation mitigation is suggested in conjunction with this project.

Institution Uses, Other Than Public Schools, Not Meeting Development Standards in Multifamily Zones

Land Use Code Section: 23.45.122

1. Bulk and Siting

1.a. Describe the special needs of the proposed facility and how the proposed location of the facility is compatible to its surroundings.

The proposed project will allow SCDS to enhance the educational facilities and improve the traffic and parking conditions for the school and neighborhood.

The school curriculum is currently constrained by space limitations and outdated facilities. The project will provide a much-needed modern educational facility for middle school students (grades 6-8) in phase I as well as much-needed upgrades to the gymnasium, lunchroom, and some new classrooms for 2nd grade. In phase II, the new building will provide upgraded facilities for 4th and 5th graders, a real administrative core, and a readily identifiable entry. These new facilities will address long-standing problems identified by the school.

The project will also address traffic and parking deficiencies in the current school. The new drive will bring most of the queuing for pickup and drop-off onto the existing school site instead of allowing cars to back up on the city streets. The number of on-site parking stalls is also increased.

The school buildings are designed to fit into the hillside condition and into the single- and multi-family neighborhoods that surround the site. Building massing, detailing, and material selections will complement the surrounding buildings and the existing school buildings. The buildings will appears as a series of linked 2-3 story buildings. The sitework, including drive lanes and landscape elements, is also appropriately scaled to the neighborhood.

1.b. Which of the development standards below are requested to be modified under this proposal to accommodate the special needs and location of the proposed institution? Please explain.
Modulation, landscaping, provision of open space, and structure width, depth, and setbacks.

In phase I, the school structures in the L-1 zone are existing structures that will not undergo significant exterior changes. Two residential buildings (one of which is a school use and one a rental residence) will be demolished. The structure that is proposed in the L-1 portion of the site is part of phase II. The explanations provided below are for the new construction in place at the completion of phase II.

Structure width, depth

a) Structure width in L-1 zone is proposed to exceed the allowable as follows:

Max. allowable bldg. width w/ modulation, landscaping	*75 feet*
Proposed bldg. width w/ modulation option	*114 feet, 2 inches*

b) Structure depth in L-1 zone is proposed to exceed the allowable as follows:

Lot depth	*120 feet*
65% allowable bldg. depth	*78 feet*
Proposed bldg. depth	*106 feet, 4 inches*

The departure is needed for several reasons. First, it is necessary due to the irregular layout and wide but shallow dimensions of the site, and the need to look at the L-1 portion of the project as part of a whole project that includes the adjoining SF5000-zoned portion. Secondly it is needed to allow the new construction to be consolidated with the existing structures, thereby reducing the bulk and scale impacts to the neighborhood. Third, the departure is needed to allow a building configuration that accommodates the new access drive location, which is an integral part of the plan for reducing neighborhood traffic impacts. The school project meets other L1 development standards and is designed to minimize the bulk and scale of the buildings.

.

2. Criteria for Dispersion

2.a. Does the proposed institution meet dispersion criteria (more than 600' to the lot line of any other institution)?

To the best of our knowledge, Seattle Country Day School meets this criterion.

2.b. Describe how the proposed new or existing institution which does not meet development standards for dispersion would not substantially aggravate parking shortages, traffic safety hazards and noise in the surrounding area.

N/A

3. Noise

3.a. Describe potential noise impacts from the proposed use and name any measures that will mitigate (lessen) the potential noise problems of this institutional use.

Examples of mitigating measures may include – existing or proposed landscaping, sound barriers or fences, mounding or berming, adjustments to yards or the location of refuse storage areas, parking location, design modifications and controlled hours for use of specific areas.

In the L-1 zone, the amount of noise impacts generated by students and staff during regular school hours and activities will not change under the existing proposal. However, additional noise impacts may be generated by traffic and parking on the new access drive and surface parking area and from students during

the pickup and dropoff periods. These potential new impacts will be mitigated through controlled time of use and through landscaping. In the covered parking constructed in phase II, noise generated by parking would be more contained.

4. Transportation Plan

4.a. A transportation plan will be required for new institutions or institutional additions of more than 4,000 sq. ft. or 20 or more parking spaces.

A transportation plan will be required for new institutions or institutional additions of more than 4,000 sq. ft. or 20 or more parking spaces. The level of detail will be based on the probable impacts and/or scale of the institution. Please see Section 23.44.022M of the Land Use Code for components. Director's Rule #2-94 describes detailed information on Transportation Management Programs (TMPs) that may be applicable to your proposal.

Since the project would add more than four thousand (4,000) square feet of new building space and twenty (20) parking spaces, a transportation plan is required.

*A transportation plan has been prepared for this project and is attached (*Seattle Country Day School Development Proposal Transportation Analysis*, Heffron Transportation, Inc., August 4, 2003). The plan details the school's trip generation, on-site parking demand and supply, on-street parking characteristics in the vicinity of the school, and general operations.*

As described in the transportation plan, the number of trips generated by the school would decrease in the future with the project (due to the demolished houses), the existing afternoon peak on-street queue is anticipated to decrease dramatically (by approximately 20 vehicles) with the new private drive, and the on-street parking utilization is expected to decrease due to increased on-site parking. Therefore, the overall traffic condition near the school is expected to be improved with the development proposal and no specific transportation mitigation is suggested to accommodate the proposed plan.

However, to address existing neighborhood concerns, SCDS has voluntarily implemented a neighborhood transportation advisory committee to address operational issues related to student drop-off and pick-up activities, parking, and special events. In addition, SCDS proposes a contribution toward a Neighborhood Transportation Plan to address other transportation issues in the neighborhood including speeding, misaligned traffic circles, and cut-through traffic. No other transportation mitigation is suggested in conjunction with this project.

CITY OF SEATTLE

Application Form for Variances

NOTE: This form has been completed by SCDS. It has not been edited or modified by DPD

Seattle Country Day School
2619 4th Avenue North
DCLU Project No. 2302435

Please describe the proposed project indicating square footage of structure, height (1,2,3 stories, etc.) and other specific details that communicate, with the plans, the nature of the proposed development on the subject site and the features that require a variance.

Project description:

The proposed project is construction of two new 2-3 story academic buildings, parking areas and associated sitework, and renovation of existing structures at an existing K-8 independent school. The project will likely be constructed in two phases with up to 5 to 10 years between phases. A Master Use Permit is being sought for both phases. Although the timing of phase II is not yet certain, it is included in the Master Use Permit in order to facilitate a comprehensive review of the School's development plans.

The school will increase in size from approximately 43,000 SF of classroom and administrative space to 77,000 SF at the end of phase II, plus a 10,000 SF parking garage.

The project goals are to improve and enhance the educational facilities at the school and to address traffic and parking issues for the school and neighborhood. The curriculum is currently constrained by space limitations and outdated facilities. The phase I scope includes creation of a new building for the middle-school students (grades 6-8), renovation of other facilities including changing the use of the house at 2632 Nob Hill Avenue North (Building 8) from residential to school use, new parking and playfield, addition of a new private drive for improved student pickup and drop-off operations, and street improvement of the end of Nob Hill Avenue North. The phase II scope includes an approximately 29-car parking garage, a new building housing administration and improved classroom space for the K-5 grades, and relocation of the playfield constructed in phase I.

The property occupies two zones, SF-5000 and L-1. Lot coverage limits apply to each zone, independent of each other. The SF-5000 lot coverage limit of 35% would be slightly exceeded (by 1.4% to 36.4%) in order to retain an existing residential structure in the SF-5000 zone at 2632 Nob Hill Avenue North. However, the L-1 zone will be developed to 34%, which is under the maximum 40% allowed in that zone.

The most important reason for retaining the building is to keep the northern edge of the property more in-scale with the neighborhood. It would serve as a buffer between other school facilities and the proposed drive and the residential neighborhood to the north. The building would be used for administrative space or as a classroom space, but will remain unchanged architecturally. If the variance were to be denied, the School would still need to proceed with the other construction in the SF-5000 zone, which is essential, but in order to meet lot coverage, would demolish the residential structure and just landscape the vacant area.

In summary, this variance request proposes the following exceptions to the existing Land Use regulations:

1. Exception to lot coverage limitation of 35% in the SF-5000 portion of the property.

Please provide a response to each of the five questions below. You may wish to use a separate sheet for your answers. However, please number your answers to the questions listed below.

1. How do you meet variance criterion #1?

Variance Criterion #1 – Because of the unusual circumstances applicable to the subject property, including size, shape, topography, location, or surroundings, which were not created by the owner or applicant, the strict application of this Land Use Code would deprive the property of rights and privileges enjoyed by other owners in the same zone or vicinity.

1. *The proposed project includes a new access drive, surface parking, and a playfield in the only portion of the property where it is possible to construct those features. The site is extremely constrained by existing buildings, steep slopes, and the shape of the property, which are unique circumstances.*

   This proposed variance would allow the school to retain an existing structure to act as a buffer between the neighboring buildings and the new construction. The alternative would be to remove the structure and to have a vacant parcel between the neighboring parcels and the school facilities.

2. How do you meet variance criterion #2?

Variance Criterion #2 – The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute special privilege inconsistent with the limitations upon other properties in the vicinity and zone in which the subject property is located.

2. *The proposed variance includes only 1.4% lot coverage over the maximum, and the purpose is to afford some mitigation for the surrounding neighborhood.*

3. How do you meet variance criterion #3?

Variance Criterion #3 – The granting of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zone or vicinity in which the subject property is located.

3. *No element of the proposed building to remain will materially affect neighboring properties different from existing uses. The building is currently used as a residence. Under this proposal, it is being converted to administrative or classroom use (converted to administrative use in phase I and possibly to classroom use in phase II) but will remain unchanged architecturally. The proposal to retain this building despite being over the lot coverage limits is an attempt to minimize changes to the character of the north edge of the property.*

4. How do you meet variance criterion #4?

Variance Criterion #4 – The literal interpretation and the strict application of the applicable provisions or requirements of the Land Use Code would cause undue hardship or practical difficulties.

4. *Literal interpretation of the 35% lot coverage limitation would require this structure be removed at the completion of the proposed project, since all available lot coverage would be used by other school facilities. This would cause a hardship by eliminating a buffer between the School and the neighborhood. Retaining this structure is the most practical method of providing a buffer.*

5. How do you meet variance criterion #5?

Variance Criterion #5 – The requested variance would be consistent with the spirit and purpose of the Land Use Code and adopted Land Use Policies or Comprehensive Plan, as applicable.

5. *The proposed variance would be consistent with the general purpose of the Land Use Code to "maintain a compatible scale within an area" and to "achieve an efficient use of the land." SMC 23.02.020. Also, the variance is consistent with the policies in the Comprehensive Plan for Single Family Residential Areas, specifically Goal 42 ("Maintain the character of areas that are predominantly developed with single family structures.") and Goal 45 ("Provide flexibility to maintain and improve existing structures.")*

Appendix C – Transportation Technical Report

DRAFT EIS
TRANSPORTATION TECHNICAL REPORT

SEATTLE COUNTRY DAY SCHOOL
MUP #2302435

Prepared by:

heffron transportation, inc.

6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 ◆ fx: (206) 523-4949

JUNE 29, 2004

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FIGURES

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1. INTRODUCTION

This report summarizes the transportation impact analysis for the proposed Seattle Country Day School (SCDS) project. Its purpose is to evaluate the traffic and parking-related impacts to support the Draft Environmental Impact Statement for the project. The transportation impacts addressed by this report include the school's affect on the roadway system, intersection operations, traffic safety, parking, and other transportation elements. Some information in this report was gathered during the preparation of the project's original transportation memorandum (*Seattle Country Day School Development Proposal Transportation Analysis*, Heffron Transportation, Inc., August 4, 2003). However, most information in this report has been updated to address comments received during the scoping process.

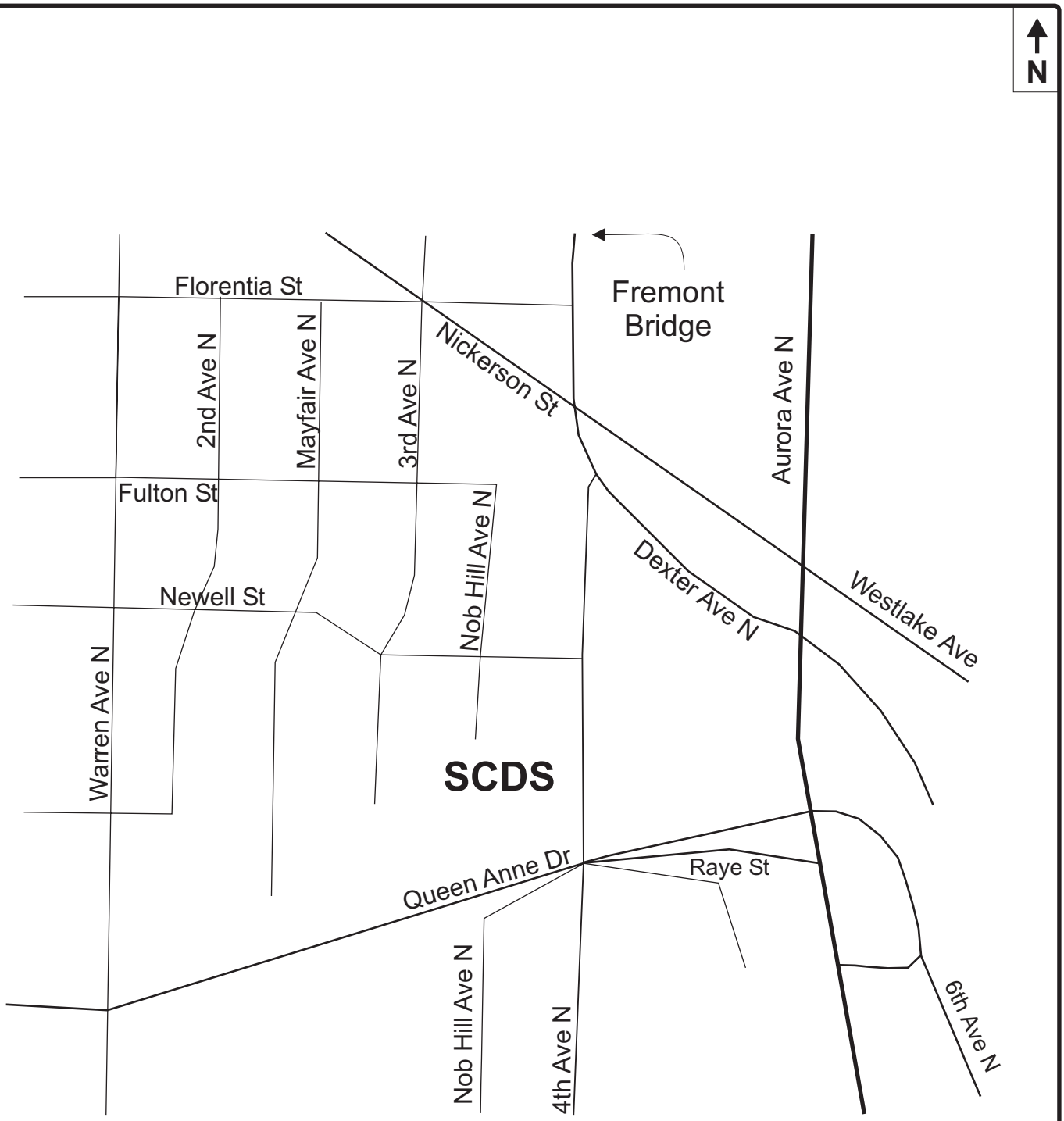
1.1. Existing Site Description

SCDS is located at 2619 - 4th Avenue N on the north side of Queen Anne Hill in Seattle. Figure 1 shows the project site location and vicinity. SCDS has been operating on its Queen Anne Hill site since 1964; the original school building was constructed in 1928. SCDS currently serves approximately 303 elementary and middle school students and employs 56 faculty and staff. (Note: SCDS' existing trip generation described in this report is based on a school enrollment of 303 students. Enrollment has increased by two students and is now 305 students. The increase of two students would slightly increase the school's existing trip generation, but would not affect future traffic projections included in this report since those projections are based on an enrollment of 328 students.) The campus extends east to 4th Avenue N and north to Newell Street. It is bounded by residential units to the west (just west of Nob Hill Avenue) and a steep hillside to the south. The campus includes the main school building with classrooms for grades K-3, the cafeteria, library, and some administration offices; the middle school building with classrooms for grades 4 thru 8; and the gym and gym annex. The school also owns six houses adjacent to the school—one is used for school administration office space, one is used for storage, and four are rental properties.

The school has three on-site parking lots—one north of the middle school (4 spaces), one that includes the drop-off/pick-up area east of the lower school (10 spaces), and one up the hill southeast of the lower school (15 spaces)—for a total of 29 on-site parking spaces. Twenty-six (26) parking spaces are general-use spaces available to faculty, staff, and visitors; one parking space in the drop-off/pick-up area is used for a small school bus; and two spaces are restricted to handicapped-accessible vehicles.

Most students arrive on campus between 7:30 and 8:30 A.M. on school days. The school day begins at 8:15 A.M. and 8:30 A.M. for the middle and lower schools, respectively. Pick up for grades K thru 3 begins at 2:50 P.M. Pick up for grades 4 thru 8 and carpools begins at 3:10 P.M. Students not participating in after-school activities usually leave school by 3:30 P.M.

There is also an extended-day program at SCDS. This program offers childcare for students before and after school. The program operates between 7:30 and 8:30 A.M. and between 2:50 and 6:00 P.M. when school is in session. According to SCDS staff, there are approximately 20 students in the before-school program and about 55 students in the after-school program. Morning drop-off occurs between 7:00 and 8:00 A.M. and afternoon pick-up typically occurs between 4:00 and 6:00 P.M.



SEATTLE COUNTRY DAY SCHOOL EIS

Figure 1

SITE VICINITY

heffron transportation, inc.

Most faculty and staff travel to and from the school via private vehicle (either alone or in carpools). Most arrive at school between 7:30 and 8:30 A.M. and leave between 3:00 and 6:30 P.M., with the majority leaving between 4:00 and 5:00 P.M. Faculty and staff park either on site in one of the school's parking lots, in on-street parking spaces near the school, or in the gravel lot north of the condominiums located across 4th Avenue N from SCDS. This gravel lot provides overflow parking for the condominium and is informally used by some faculty and staff.

Most students are transported to and from school by parents, but a few students do walk to and from school. Parents either drop off and pick up their children using SCDS' designated student drop-off and pick-up area on 4th Avenue N, or park on a nearby roadway and walk their children to school. The existing student drop-off and pick-up area can accommodate approximately seven queued vehicles at one time.

SCDS has plans to reorganize its middle school's grade structure in the future, which may increase its student enrollment by up to 25 students for a total of 328, and increase its staff by up to five for a total of 61. This level of enrollment could occur in 2006 and 2010 with or without the proposed redevelopment project.

2. AFFECTED ENVIRONMENT

This section includes descriptions of the existing and future-without-project roadway network, traffic volumes, traffic operations, drop-off and pick-up operations, site access, parking, charter bus operations, event conditions, safety, transit facilities, and non-motorized facilities. These are the conditions against which the proposed project would be compared.

2.1. Roadway Network

The study area for this analysis was determined based on roadways and intersections currently used by SCDS trips, and could be affected by the SCDS redevelopment project. The study area for the transportation analysis is shown on Figure 1 and includes the following roadways and intersections:

North/South Roadways
- 4th Avenue N
- Nob Hill Avenue N
- 3rd Avenue N
- Mayfair Avenue N
- Warren Avenue N

East/West Roadways
- Queen Anne Drive
- Newell Street
- Florentia Street
- Nickerson Street

Intersections
- Nickerson St/3rd Ave N/ Florentia St
- Queen Anne Dr/4th Ave N/Raye St

The existing roadway conditions are described below:

4th Avenue N is a two-lane, north-south roadway that provides access between Galer Street to the south on Queen Anne Hill and Dexter Avenue to the north. It is designated by the City of Seattle as an "Access Street," which is defined as a roadway that serves both residential and commercial uses. Between Queen Anne Drive and Newell Street, 4th Avenue N has a steep south-to-north downgrade and unrestricted parking on both sides of the street. Between Queen Anne Drive and Newell Street, the roadway is approximately 24.5 feet curb-to-curb with approximately 22 feet of travel width. North of Newell Street, 4th Avenue N is signed for "Local Access Only" and its width narrows to about 16 feet.

The conditions at the edge of the roadway vary between Queen Anne Drive and Newell Street. South of the school, there are shoulders on both sides of the roadway that provide space for parallel parking. Adjacent to the site on the west side of the roadway, there is unrestricted angle parking. On the east side of the street adjacent to the condominiums, 4th Avenue N has curb, gutter, a landscape strip, and paved sidewalks. South of the condominiums, there is rolled curb and shoulder on the east side of the street. On the west side of 4th Avenue N, there is a paved shoulder and walkway south of the school, and rolled curb and sidewalk adjacent to the school.

In the site vicinity, stop signs control 4th Avenue N's intersections with Queen Anne Drive to the south and Dexter Avenue to the north. Its intersection with Newell Street is uncontrolled. There are "Do Not Enter" signs posted at the north end of 4th Avenue N to deter southbound vehicles from entering the roadway from Dexter Street. However, vehicles have been observed ignoring these signs.

Nob Hill Avenue N is a two-lane, north-south access street. Near the site, it dead ends to the south at SCDS and extends two blocks to the north to Fulton Street. Between SCDS and Fulton Street, Nob Hill Avenue N has unrestricted, parallel parking on both sides of the street. There is curb, gutter, and a paved sidewalk on each side of the street. The curb-to-curb width is approximately 25 feet. Nob Hill Avenue N's intersection with Fulton Street is uncontrolled, and there is a traffic circle located at its intersection with Newell Street.

3rd Avenue N is a two-lane, north-south access street. Near the site, it connects Newell Street to the south with Nickerson and Etruria Streets to the north. 3rd Avenue N has unrestricted parking on both sides of the street. There are curbs, gutters, and paved sidewalks on both sides, and its curb-to-curb width is approximately 25 feet. There is a traffic circle located at its intersection with Newell Street, there is no traffic control at its intersection with Fulton Street, and its intersection with Nickerson Street/Florentia Street is controlled with a traffic signal.

Warren Avenue N is a two-lane, north-south access street that connects McGraw Street to the south with Nickerson Street to the north. On-street parallel parking is permitted on both sides of the street. There are curbs, gutters, and paved sidewalks on both sides of the street, and its curb-to-curb width is approximately 25 feet. There are traffic circles located at its intersections with Fulton Street, Newell Street, and Raye Street. Warren Avenue's approaches to both Nickerson Street and to Queen Anne Drive are controlled with stop signs.

Queen Anne Drive is a minor arterial that provides east-west access between Aurora Avenue N and Queen Anne Avenue N. It has one lane in each direction and on-street parking is permitted only along the north side of a small section just west of 4th Avenue N. Queen Anne Drive has curbs, gutters, and sidewalks on both sides, and its curb-to-curb width is approximately 32 feet. It intersects with both Raye Street and 4th Avenue N to create a seven-leg intersection. All legs of this intersection are controlled with stop signs. The speed limit on Queen Anne Drive is posted at 30 mph.

Newell Street is a two-lane, east-west access street that connects 1st Avenue N to the west with 4th Avenue N to the east. There are curbs, gutters, and sidewalks on both sides, and its curb-to-curb width is approximately 25 feet. There are traffic circles located at its intersections with Nob Hill Avenue N, 3rd Avenue N, and Warren Avenue N. On-street parking is permitted on both sides of the street. However, there are signs that prohibit parking from 2:00 to 4:00 P.M. along the south side of Newell Street in front of the first two houses immediately west of 4th Avenue N.

Florentia Street is a two-lane collector arterial that provides east-west access between the Fremont Bridge and 3rd Avenue W. On-street parking is prohibited between the bridge and Nickerson Street, but permitted

on the north side of the street west of Nickerson. There are curbs, gutters, and paved sidewalks on both sides, and its curb-to-curb width is approximately 25 feet. A stop sign controls its approach to 3rd Avenue W; a traffic signal controls its intersection with Nickerson Street/3rd Avenue N.

Nickerson Street is a principal arterial that provides southeast-northwest access between the Fremont Bridge and 15th Avenue W. East of the Fremont Bridge, Nickerson Street becomes Westlake Avenue. Nickerson Street has two travel lanes in each direction plus additional turn lanes at major intersections. There are curbs, gutters, and sidewalks on both sides. On-street parking is generally permitted on both sides of the roadway, except near intersections. Nickerson Street bisects the signalized 3rd Avenue N/ Florentia Street intersection creating a six-leg intersection. The speed limit on Nickerson Street is 30 mph.

There is one major temporary roadway change that is currently planned in the site vicinity. The Fremont Bridge is proposed to be reconstructed beginning in 2005 and ending in 2008. This project will include replacing the north and south bridge approaches, upgrading the north approach off-ramp to NE 34th Street, upgrading the electrical/mechanical system used to raise and lower the bridge bascule, and reconstructing the bridge maintenance shop located beneath the south approach structure. The bridge is planned to be reduced from two lanes to one lane in each direction during part of the construction period, which is expected to divert many vehicles to alternative routes. Some vehicles may travel through the study area near SCDS to avoid the construction area, which could cause temporary traffic increases in the site vicinity. SDOT is currently evaluating improvement options to help reduce the temporary impacts due to the bridge construction. However, there are currently no specific improvement plans identified within the project study area.

WSDOT has recently completed its *SR 99 North Corridor Study*, which included recommended improvements at the Queen Anne Drive/4th Avenue N/Raye Street intersection. The City of Seattle controls this intersection and has been evaluating possible improvements. According to City of Seattle staff, no specific changes to this intersection have been identified at this time. In addition, there are no major transportation improvement projects funded for the study area in City of Seattle's *2003-2008 Adopted Capital Improvement Program*. Therefore, existing geometric and signal conditions were assumed to remain for future year 2006 and 2010 conditions without the SCDS Redevelopment Project (No Action conditions).

2.2. Traffic Volumes

The following sections summarize SCDS and background traffic volumes for the existing, future 2006-without-project, and 2010-without-project conditions. The year 2006 is the expected opening year for Phase 1 of the new school. Although the timing for Phase 2 development has not been finalized, it is assumed that Phase 2 could be complete and occupied in 2010.

Existing School Trips

School-related trip generation was determined by performing a transportation survey at SCDS in November 2003. Surveys were developed for faculty, staff, and parents to determine the mode of travel and travel routes used to and from school on an average school day. Copies of the survey forms are in the Appendix. Completed surveys were received from 77% of SCDS faculty and staff (43 of the 56 faculty/staff), and 57% of the SCDS families (133 of the 235 families representing 177 of the 303 students). The survey results were used to determine the percentage of faculty/staff and students who use each mode of travel. These were then applied to the school's entire population. The mode of travel used is summarized in Table 1.

Table 1. SCDS Modes of Travel

	# of persons	Drive Alone	Carpool [a]	Drop-off Pick-up [b]	Walk, Bike, Other	Total
Faculty/Staff	56					
To/From School		49 (88%)	3 (5%)	0 (0%)	4 (7 %)	56 (100%)
Students	303					
To School		0 (0%)	12 (4%)	279 (92%)	12 (4%)	303 (100%)
From School		0 (0%)	6 (2%)	291 (96%)	6 (2%)	303 (100%)

Source: SCDS Transportation Survey, 2003

a For this survey, a faculty/staff "carpool" was defined as someone who drove with others and parked at the site. A student "carpool" was defined as a student who was driven to school by someone who would park at school for the day.

b Drop-off/pick-ups for students include parent who drop off or pick up one or more children.

As shown, most faculty/staff drive themselves to and from school and use the same travel mode in the morning and afternoon. The vast majority of students are dropped off in the morning and picked up in the afternoons, while a few carpool and walk to school. The percentage using each mode of travel differs slightly before and after school. A few students who carpool or walk to school in the morning are picked up after school. The mode of travel percentages are consistent with findings at other independent K-8 schools located in Seattle neighborhoods where public transit options are limited.

Daily trips generated by SCDS on an average day were estimated based on the survey information presented above and are shown in Table 2. Daily trip generation was estimated by assuming that each SOV, HOV driver, visitor, and delivery makes two trips per day—one to the school and one from the school. Drop-off vehicles were assumed to make four trips per day—two trips in the morning (to and from the site), and two trips in the afternoon. Based on the survey data, each parent-driven vehicle drops off or picks up an average of about 1.5 students.

Trips occurring in the peak hours were estimated based on information provided by faculty, staff, and parents regarding typical school arrival and departure times. According to SCDS staff, the school has an average of 30 visitors per day and about five deliveries. These trips were assumed to occur throughout the day, but were not assumed to occur during the peak hours. This analysis assumes that all students, faculty, and administrative staff would be on site on an average day. Since it is likely that some students, faculty, and staff would be absent on an average day, this assumption provide for a conservatively high estimate of trip generation and represent a worst-case condition. About 43% of SCDS' daily trips occur in the AM peak hour, 34% occur in the school's PM peak hour, and about 5% occur in the commuter PM peak hour.

Table 2. Existing SCDS Trip Generation Estimates [1]

Trip Type	Daily Trips [2]	AM Peak Hour Trips (7:30 to 8:30 A.M.)			School PM Peak Hour Trips (2:30 to 3:30 P.M.)			PM Peak Hour Trips (5:00 to 6:00 P.M.)		
		In	Out	Total	In	Out	Total	In	Out	Total
Faculty/Staff	116	40	0	40	2	3	5	1	32	33
Parents	748	181	181	362	157	155	312	9	9	18
Shuttle Bus	10	0	0	0	1	0	1	0	0	0
Visitors/Deliveries [3]	70	0	0	0	0	0	0	0	0	0
Total	944	221	181	402	160	158	318	10	41	51

Source: SCDS Transportation Survey, November 2003.

1. Based on a student enrollment of 303 students and 56 faculty/staff.

2. Two trips were assumed for each SOV, HOV, and visitor (one trip to the site and one trip from the site), and four trips were assumed for each drop-off/pick-up vehicle (two trips in morning/two in afternoon). Faculty/staff were assumed to make 12 additional trips per day for meetings or off-site errands. Based on information gathered from SCDS, approximately 1.5 students are dropped-off or picked-up per vehicle.

3. Thirty visitors were assumed on an average day for a total of 60 trips. No visitor trips were assumed to occur during the peak hours. Five deliveries were assumed on an average day including mail, Federal Express, UPS, and two others (such as food, office supplies, cleaning supplies, or recycling); each delivery accounts for two trips (one entering and one exiting).

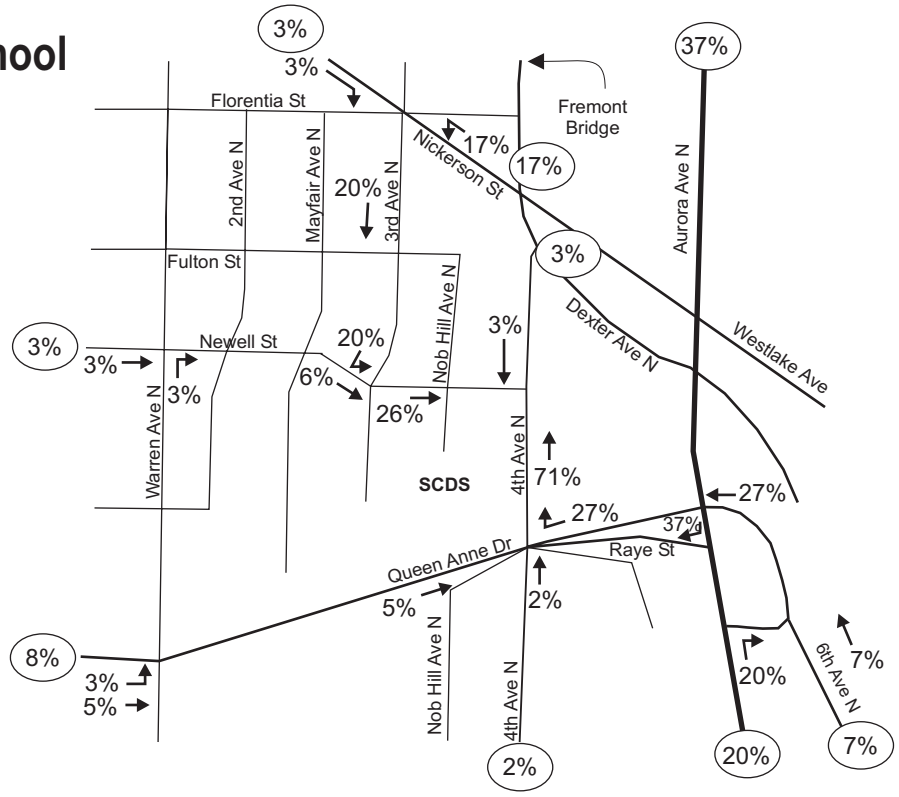
In addition to travel mode, the SCDS transportation survey requested information from faculty/staff and parents about travel routes to and from the school in the morning and afternoons. This information, along with traffic volume and on-street parking count data described in subsequent sections, was used to determine travel routes used by faculty, staff, and parents on an average school day. This information was compiled and is shown on Figure 2 thru Figure 4. Existing AM and School PM peak hour SCDS trips were assigned to the vicinity roadways based on these percentages and are shown on Figure 5 and Figure 6, respectively.

Figure 2 shows the travel routes for faculty/staff. In the morning, when faculty and staff are arriving at school ("To School" on the top half of the figure), most (71%) arrive from the south on 4th Avenue. The next most-used travel route is 3rd Avenue N from the north (20%). In the afternoon when faculty and staff are leaving the site ("From School" on the bottom half of the figure), 4th Avenue N is still the primary egress route, but the percentage of trips is lower than in the morning (59%). A higher percentage of faculty/staff exit the site to the north via 3rd Avenue N (28%).

Figure 3 shows the travel routes of parent drop-off trips in the morning. Because parents both arrive at and leave the site vicinity when dropping off students, two separate travel route maps were prepared. The top half of the figure shows the arrival routes and the bottom half shows the departure routes. This figure shows that parents choose many different neighborhood streets to arrive and depart the site. The primary routes include 4th Avenue N (with 46% of the arriving and 60% of the departing trips), 3rd Avenue N (with 38% of the arriving and 26% of the departing trips), and Nob Hill Avenue N (with 11% of the arriving and 17% of the departing trips). Newell Street (west of 3rd Avenue N) and Warren Avenue N are also used with about 12% of the entering and 6% of the exiting traffic. Parents indicated that they use 4th Avenue N between Dexter Avenue N and Newell Street even though through traffic on this street is prohibited.

Figure 4 shows the travel patterns for the afternoon student pick-up period. Again, two routes are shown since parents both arrive and depart the site during this time period. Parent travel patterns in the afternoon are similar to the travel patterns in the morning.

To School



From School

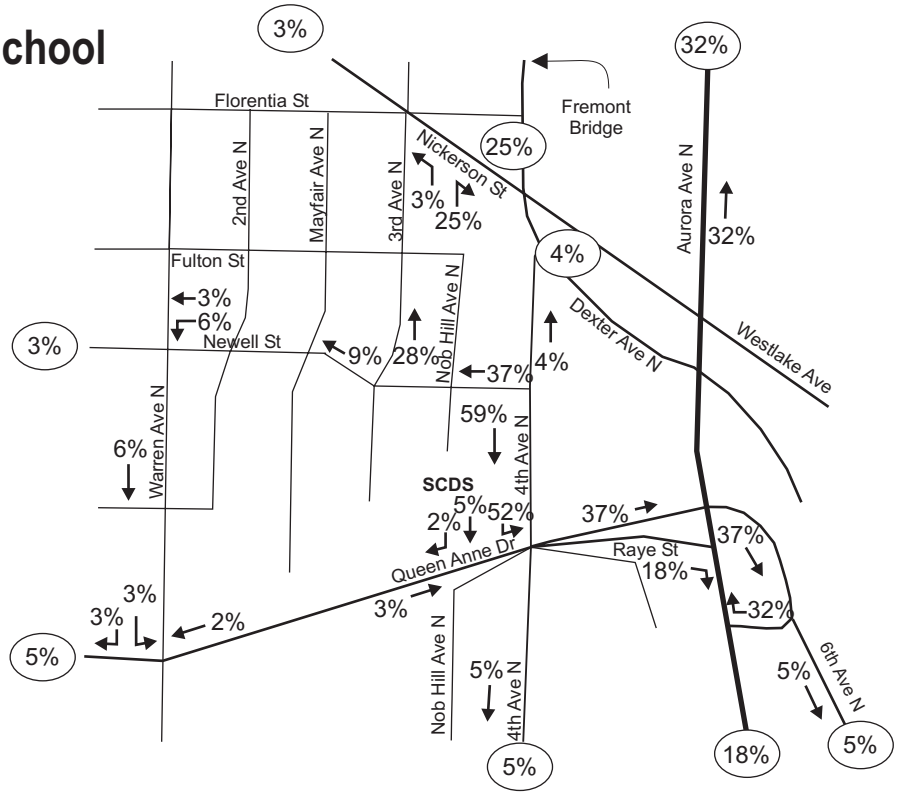


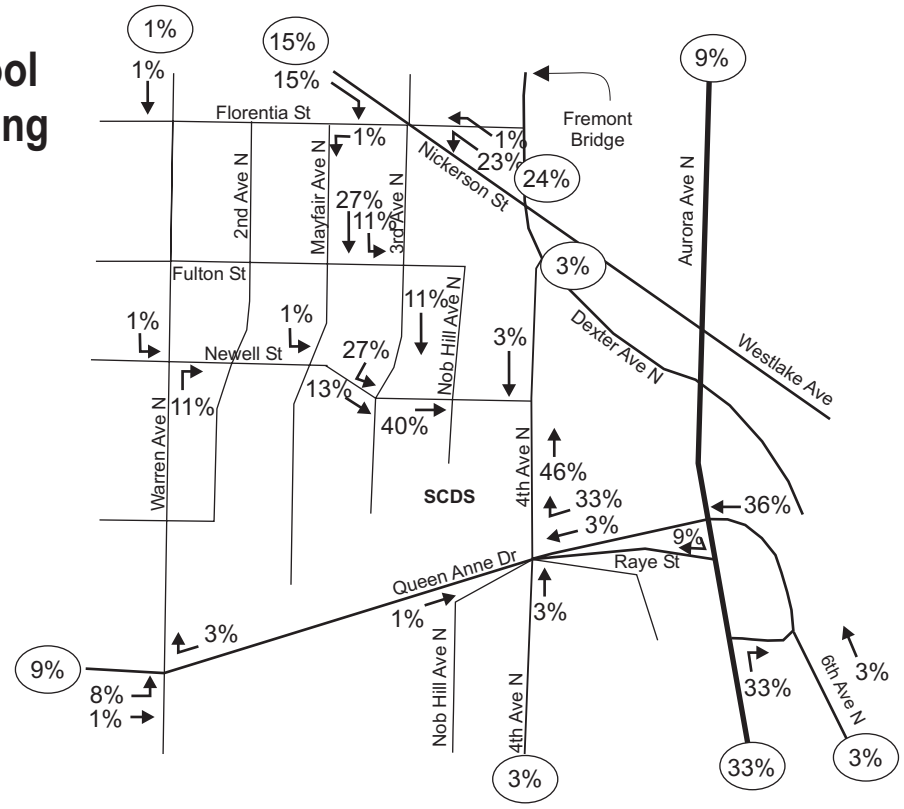
Figure 2

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING FACULTY/STAFF TRIP DISTRIBUTION PERCENTAGES

heffron **transportation**, inc.

To School in Morning



From School in Morning

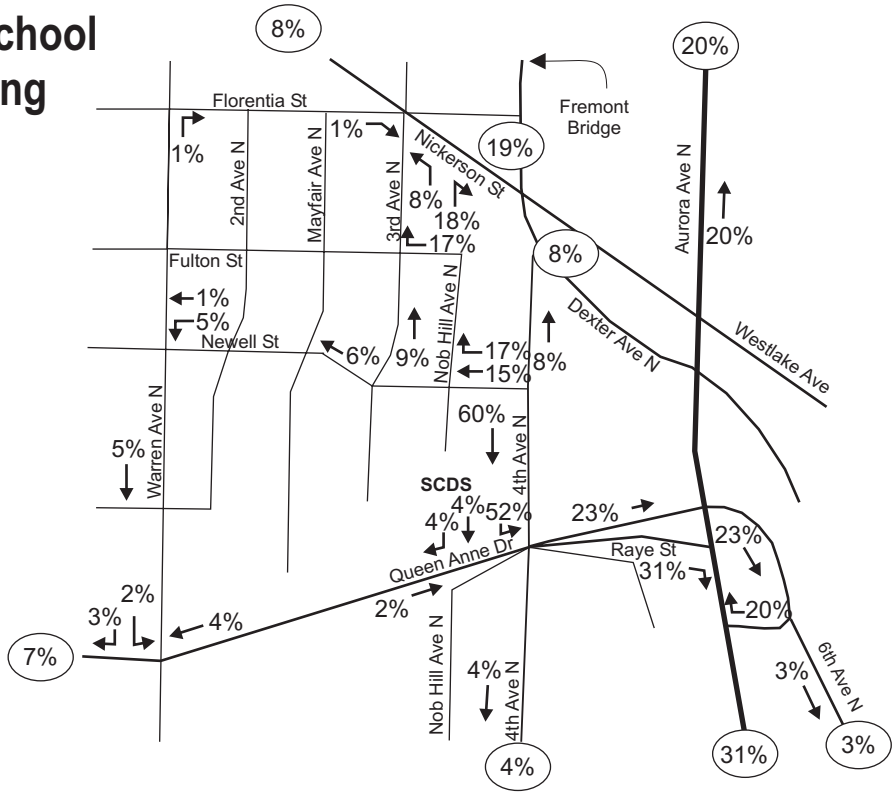


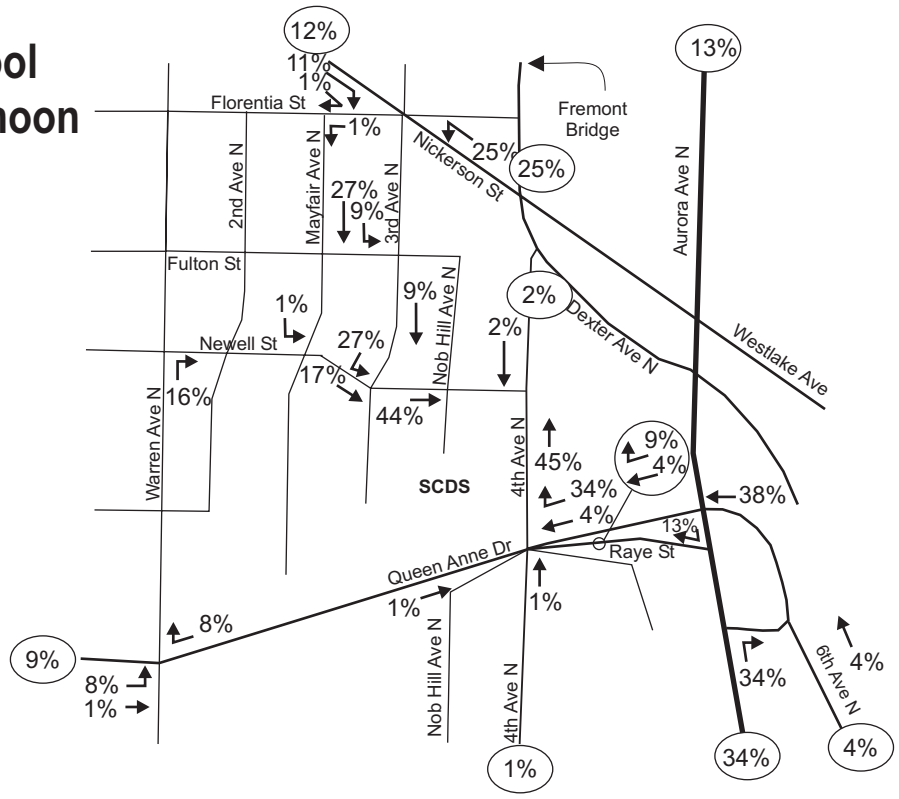
Figure 3

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING PARENT TRIP DISTRIBUTION PERCENTAGES FOR MORNING DROP OFF

heffron transportation, inc.

To School in Afternoon



From School in Afternoon

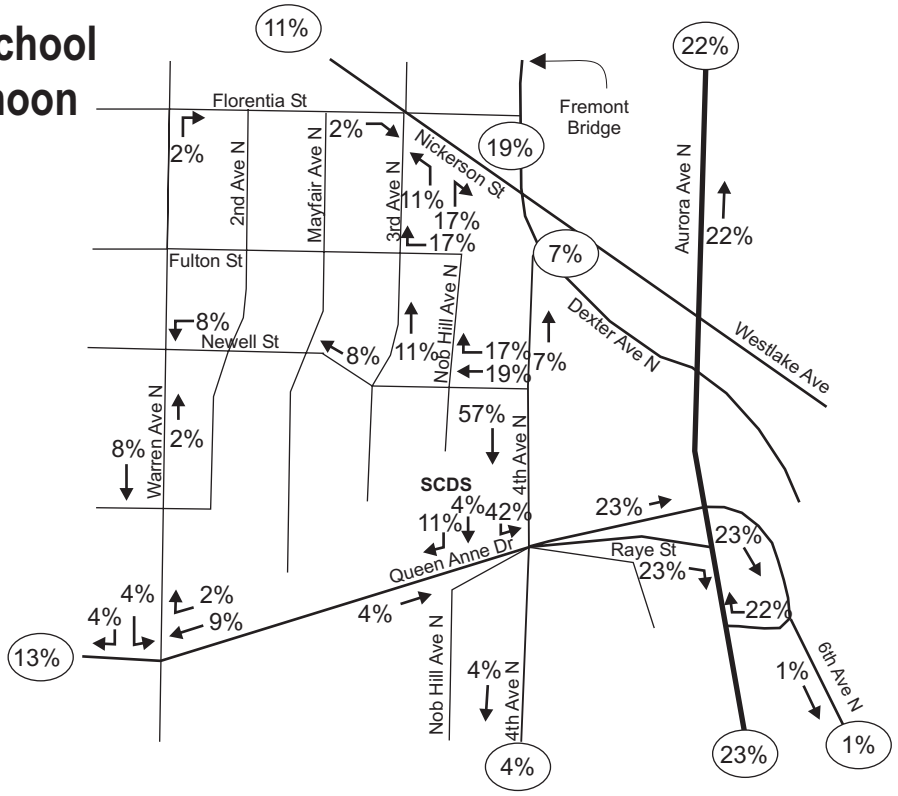


Figure 4

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING PARENT TRIP DISTRIBUTION PERCENTAGES FOR AFTERNOON PICK-UP

heffron **transportation**, inc.

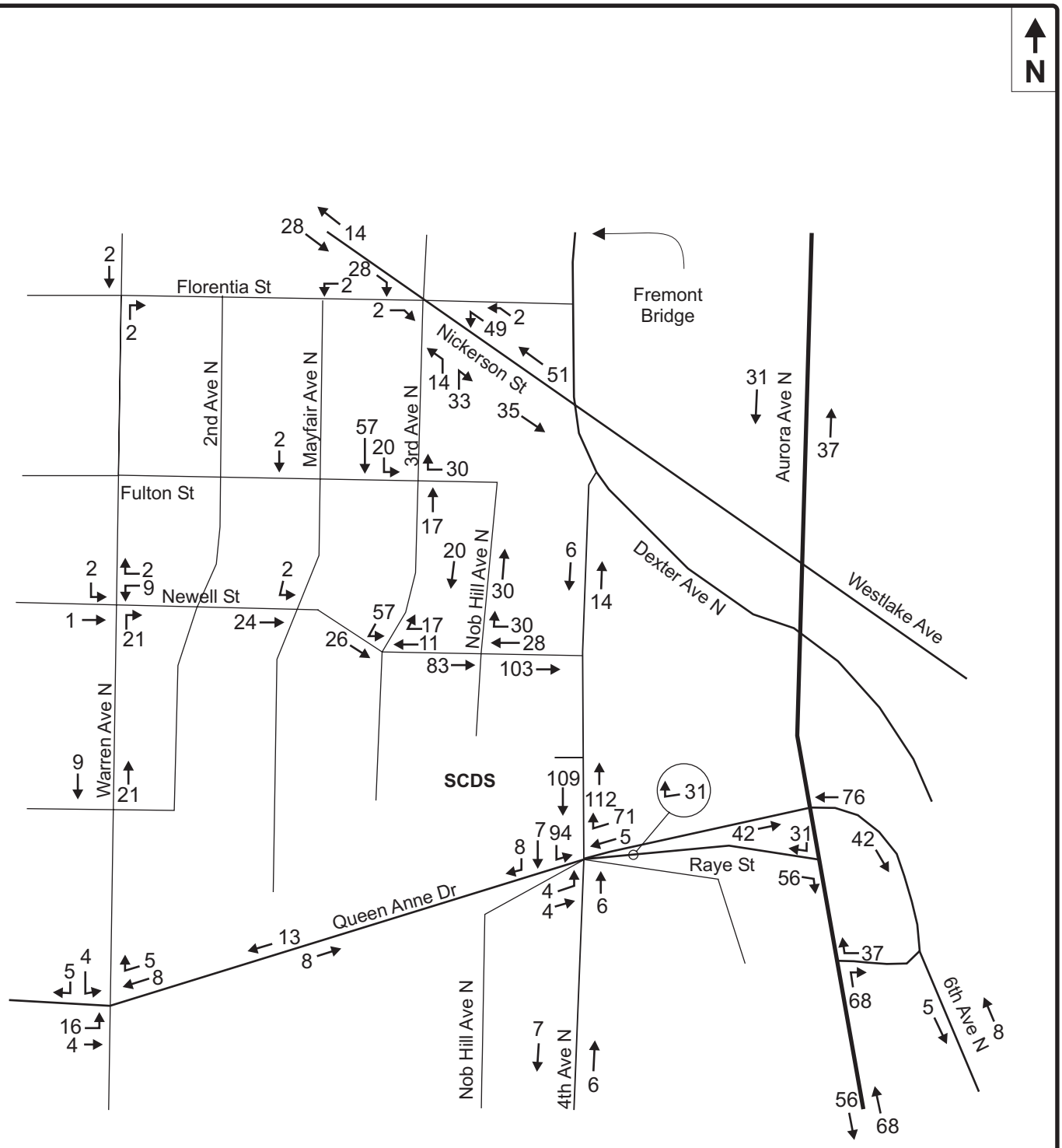


Figure 5

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING SCDS TRIPS
AM PEAK HOUR
(7:30 - 8:30 AM)

heffron transportation, inc.

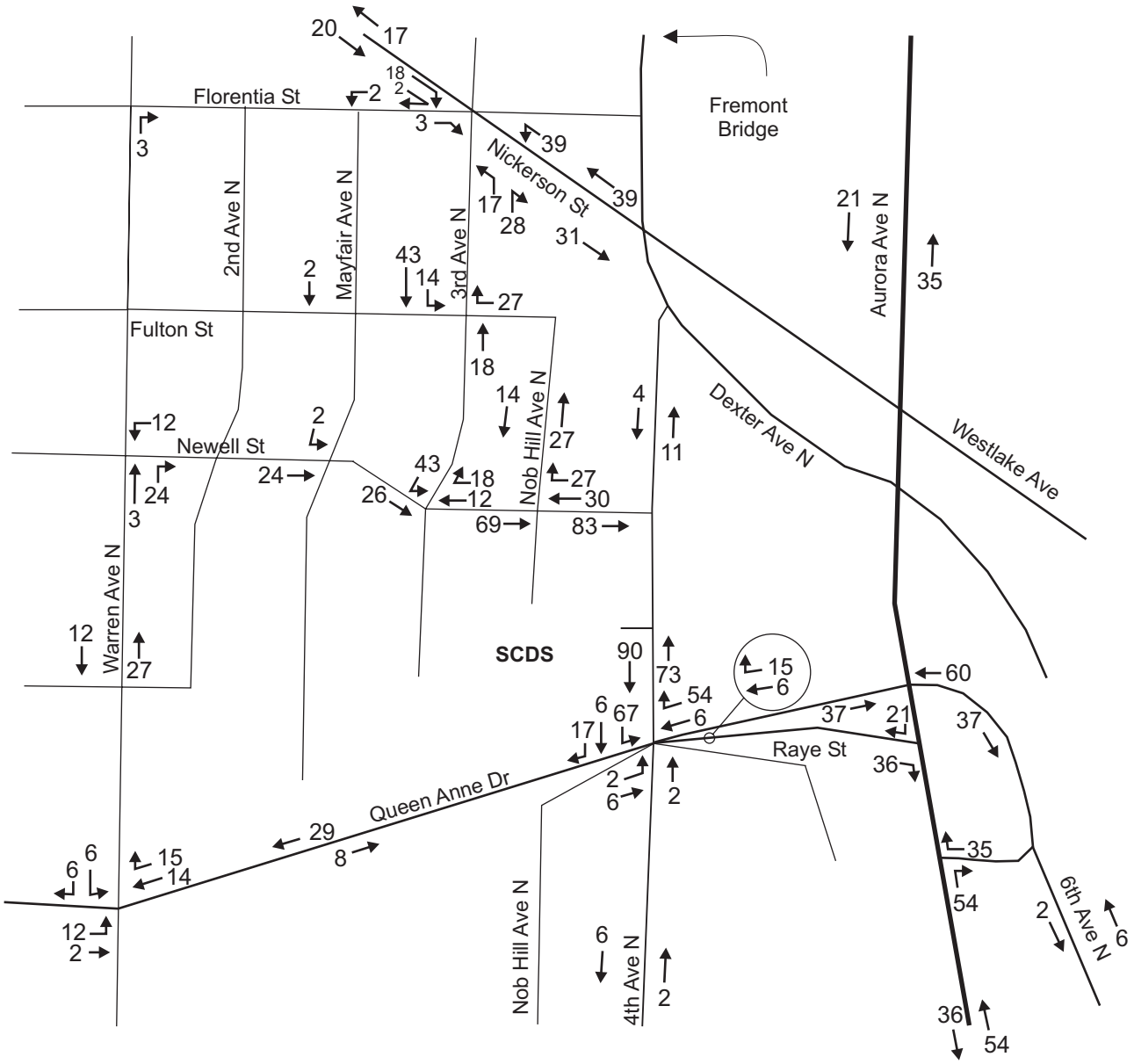


Figure 6

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING SCDS TRIPS
SCHOOL PM PEAK HOUR
(2:30 - 3:30 PM)

heffron transportation, inc.

The travel pattern information from the surveys was used to assign the school's trips to the roadway network. These assignments are shown on Figures 5 and 6 for the most-intensive before and after school periods, respectively. The highest number of AM peak hour school-related trips occurs on 4th Avenue N between the school and Queen Anne Drive (221 trips). The next highest school-related volume during the AM peak hour occurs on Newell Street between Nob Hill Avenue N and 4th Avenue N (161 trips). However, traffic volumes on this section of Newell Street (between Nob Hill Avenue N and 4th Avenue N) may be higher due to vehicles circulating for parking spaces and maneuvering to get into the queue to access the drop-off area.

The after-school traffic volumes are slightly lower than those in the morning because most faculty/staff leave later in the day and some children attend the extended-day program after school. The highest number of afternoon school-related trips in the school PM peak hour (2:30 to 3:30 P.M.) occurs on 4th Avenue N between the school and Queen Anne Drive (163 trips)—about 25% less than in the AM peak hour. The next highest school-related volume during the School PM peak hour occurs on Newell Street between Nob Hill Avenue N and 4th Avenue N (140 trips). As noted for the AM peak hour, traffic volumes on this section of Newell Street in the afternoon may be even higher due to vehicles circulating for parking spaces and maneuvering to get into the queue to access the pick-up area.

Future Without-Project School Trips

In 2006 without the proposed project, the number of trips generated by SCDS could increase due to a planned reorganization which could add up to 25 students and five faculty/staff. This increase, which could occur without the proposed project, could raise student enrollment to 328 and faculty/staff to 61. According to SCDS staff, no additional student enrollment or faculty/staff increases are planned by 2010. Table 3 summarizes the estimated trip generation for the 2006 and 2010-without-project condition based on the trip generation assumptions described previously.

Table 3. Future (2006 and 2010)-Without-Project SCDS Trip Generation Estimates

Trip Type	Daily Trips [1]	AM Peak Hour Trips (7:30 to 8:30 A.M.)			School PM Peak Hour Trips (2:30 to 3:30 P.M.)			PM Peak Hour Trips (5:00 to 6:00 P.M.)		
		In	Out	Total	In	Out	Total	In	Out	Total
Faculty/Staff	126	44	0	44	2	3	5	1	35	36
Parents	808	196	196	392	170	168	338	10	10	20
Shuttle Bus	10	0	0	0	1	0	1	0	0	0
Visitors/Deliveries [2]	70	0	0	0	0	0	0	0	0	0
Total	1,014	240	196	436	173	171	344	11	45	56

Source: SCDS Transportation Survey, November 2003.

1. Two trips were assumed for each SOV, HOV, and visitor (one trip to the site and one trip from the site), and four trips were assumed for each drop-off/pick-up vehicle (two trips in morning/two in afternoon). Faculty/staff were assumed to make 12 additional trips per day for meetings or off-site errands. Based on information gathered from SCDS, approximately 1.5 students are dropped-off or picked-up per vehicle.

2. Thirty visitors were assumed on an average day for a total of 60 trips. No visitor trips were assumed to occur during the peak hours. Five deliveries were assumed on an average day including mail, Federal Express, UPS, and two others (such as food, office supplies, cleaning supplies, or recycling); each delivery accounts for two trips (one entering and one exiting).

Table 4 summarizes the net change in daily and peak hour trips between existing and future (2006 and 2010)-without-project conditions. The planned reorganization could increase the school's daily and peak hour trips between 7% and 9%.

Table 4. Net Change in SCDS Trips - Existing vs. Future-Without-Project Conditions

Trip Type	Daily Trips	AM Peak Hour Trips (7:30 to 8:30 A.M.)			School PM Peak Hour Trips (2:30 to 3:30 P.M.)			PM Peak Hour Trips (5:00 to 6:00 P.M.)		
		In	Out	Total	In	Out	Total	In	Out	Total
Faculty/Staff	+10	+4	0	+4	0	0	0	0	+3	+3
Parents	+60	+15	+15	+30	+13	+13	+26	+1	+1	+2
Shuttle Bus	0	0	0	0	0	0	0	0	0	0
Visitors/Deliveries	0	0	0	0	0	0	0	0	0	0
Total	+70	+19	+15	+34	+13	+13	+26	+1	+4	+5

Source: Heffron Transportation, Inc.

Assuming that the additional faculty/staff and parent trips would use the same travel routes as described for the existing condition, the planned reorganization could add between 2 and 19 trips to the adjacent roadways during the AM peak hour, and between 3 and 14 trips during the School PM peak hour, as shown in Table 5. The additional trips represent increases of between about 5% and 9% in school-related trips through the study area intersections and on nearby roadway segments.

Table 5. SCDS Trip Increases due to Planned Reorganization

Location	Existing SCDS Trips	Additional SCDS Trips with Planned Reorganization	% Increase
AM Peak Hour Trips			
Queen Anne Dr/4th Ave N/Raye St Intersection	230	19	8.3%
Nickerson/3rd Ave N/Florentia St	128	11	7.9%
4th Avenue N, south of SCDS	221	19	8.6%
Newell St, east of 3rd Ave N	111	8	6.7%
Newell St, west of 3rd Ave N	37	2	5.1%
3rd Ave N, north of Newell St	74	6	7.5%
Nob Hill Ave N, north of Newell St	50	5	9.1%
School PM Peak Hour Trips			
Queen Anne Dr/4th Ave N/Raye St Intersection	181	14	7.2%
Nickerson/3rd Ave N/Florentia St	107	9	7.8%
4th Avenue N, south of SCDS	160	13	8.1%
Newell St, east of 3rd Ave N	99	9	8.3%
Newell St, west of 3rd Ave N	38	3	7.3%
3rd Ave N, north of Newell St	61	6	9.0%
Nob Hill Ave N, north of Newell St	41	3	6.8%

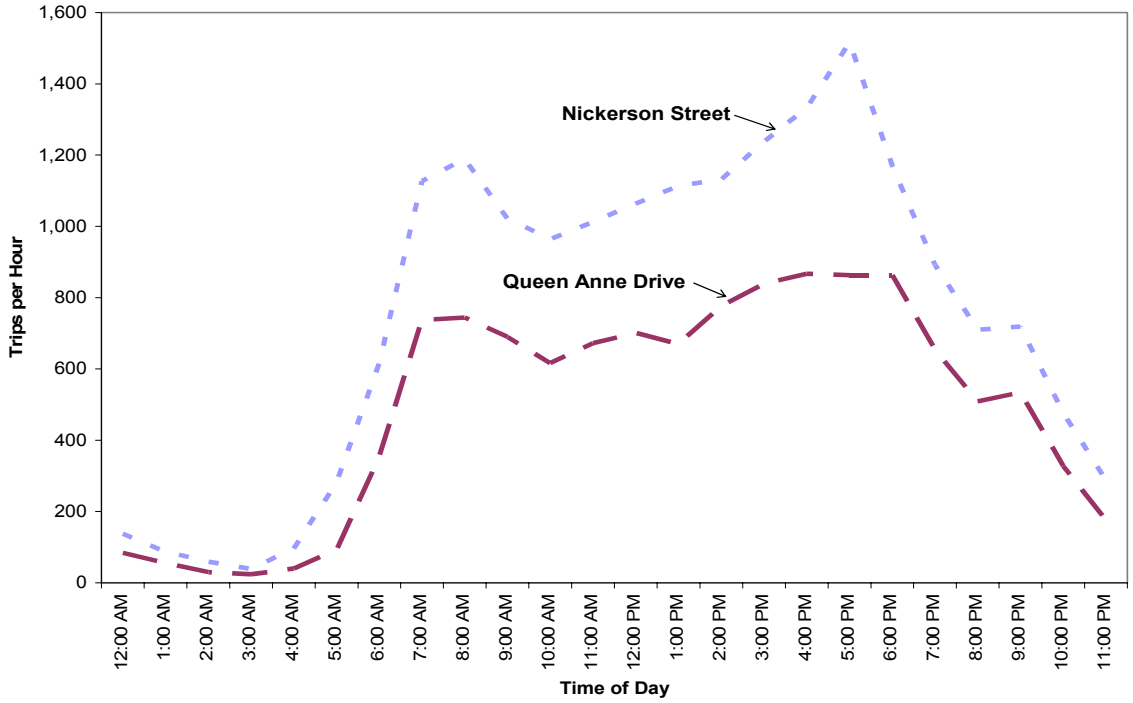
Source: Heffron Transportation, Inc.

Background Traffic

Traffic volume data in the site vicinity were collected from several sources. Seven-day machine counts on Queen Anne Drive, Nickerson Street, 3rd Avenue N, and Florentia Street were obtained from the City of Seattle. New three-day machine counts were performed specifically for this project on 4th Avenue N, Newell Street, and 3rd Avenue N in February 2004.

The machine counts along the key arterials surrounding the site were compiled to determine the peaking characteristics of local traffic. Figure 7 shows the hourly traffic volumes on the two key arterials—Queen Anne Drive and Nickerson Street. Queen Anne Drive's daily traffic has two peak periods—one during the AM peak period (7:00 to 9:00 A.M.) and another during an extended PM peak period (3:00 to 7:00 P.M.). Nickerson Street has a more traditional peaking characteristic with the highest traffic volumes occurring in the PM peak hour (5:00 to 6:00 P.M.), and the next highest traffic volumes occurring in the AM peak hour (8:00 to 9:00 A.M.). The school day at SCDS begins between 8:15 and 8:30 A.M. and many school-related trips coincide with the AM peak hour of the surrounding arterials. School is dismissed between 2:50 and 3:10 P.M. when traffic volumes on Queen Anne Drive are about 90% of the peak hourly volume, and traffic volumes on Nickerson Street are about 82% of the peak hourly volume.

Figure 7. Total Hourly Traffic Volumes on Surrounding Arterials

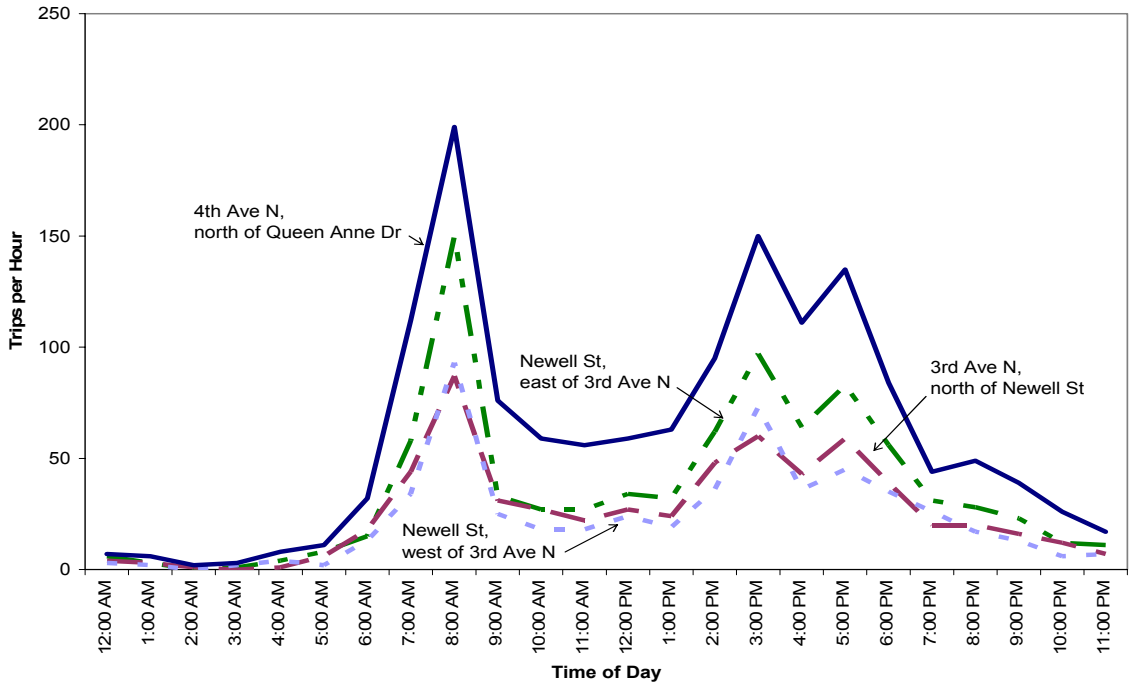


Source: Queen Anne Drive counts (east of 2nd Avenue N) by City of Seattle Department of Transportation, Thursday March 21, Tuesday March 26, and Wednesday March 27, 2002
Nickerson Street counts (northwest of Florentia for the southeast flow, and southeast of Florentia for the northwest flow) by City of Seattle Department of Transportation, Wednesday November 5, and Thursday November 6, 2003

Figure 8 shows the hourly traffic volumes on the access streets surrounding the school—4th Avenue N, Newell (east and west of 3rd Avenue), and 3rd Avenue N. Peak hour volumes on these roadways range from about 60 to 200, and coincide with the start and end of the school day at SCDS. Based on these data, the AM peak hour (7:30 to 8:30 A.M.) and the school PM peak hour (2:30 to 3:30 P.M.) were

selected for transportation analyses since these are the times when the effects of school-related traffic are the greatest.

Figure 8. Total Hourly Traffic Volumes on Surrounding Access Streets



Source: Traffic Count Consultants, February 2004

In addition to the machine counts performed in the site vicinity, AM peak hour and School PM peak hour turning movement counts were compiled from recent and new counts taken in the project study area. New AM peak hour and school PM peak hour traffic counts were performed in February 2004 at the Queen Anne Drive/4th Avenue N/Raye Street intersection located south of the school, and at SCDS' main site access driveway on 4th Avenue N. In addition, counts were performed on Nob Hill Avenue N and 4th Avenue N, north of Newell Street during the peak afternoon pick-up period (2:30 to 3:30 P.M.) in February 2004. AM and School PM peak hour turning movement counts were developed for the Nickerson Street/3rd Avenue N/Florentia Street intersection based on recent SDOT machine counts (November 2003) and a turning movement count in the *Seattle Pacific University Major Institution Master Plan* (The Transpo Group, September 1999). Figure 9 shows the existing (2004) AM peak hour traffic volumes at study area intersections and roadways. Traffic volumes at the two study area intersections represent the AM peak hour volumes that occur between 8:00 and 9:00 A.M. Traffic volumes to and from 3rd and 4th Avenues N were increased to match the peak volumes that occur on the adjacent access streets between 7:30 and 8:30 A.M. This provides for a conservatively high estimate of traffic volumes in the site vicinity and assumes that the peak hour of the school could overlap with the peak hour of the adjacent arterials. Figure 10 shows the existing (2004) school PM peak hour (2:30 to 3:30 P.M.) traffic volumes. It is important to note that the background traffic volumes described above includes all traffic currently generated by SCDS with an enrollment of 303 students.

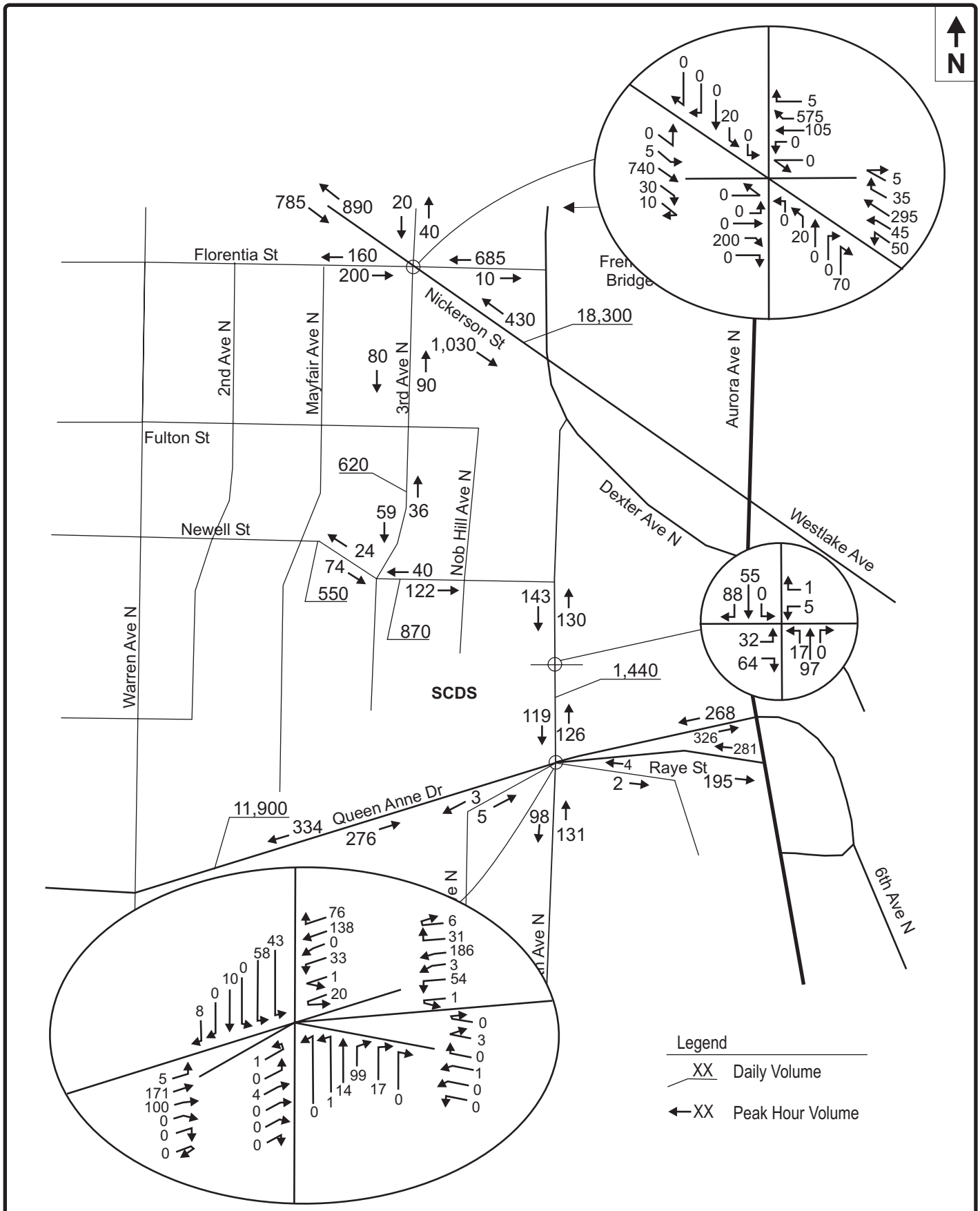


Figure 9

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING (2004) DAILY AND AM PEAK HOUR TRAFFIC VOLUMES

heffron transportation, inc.

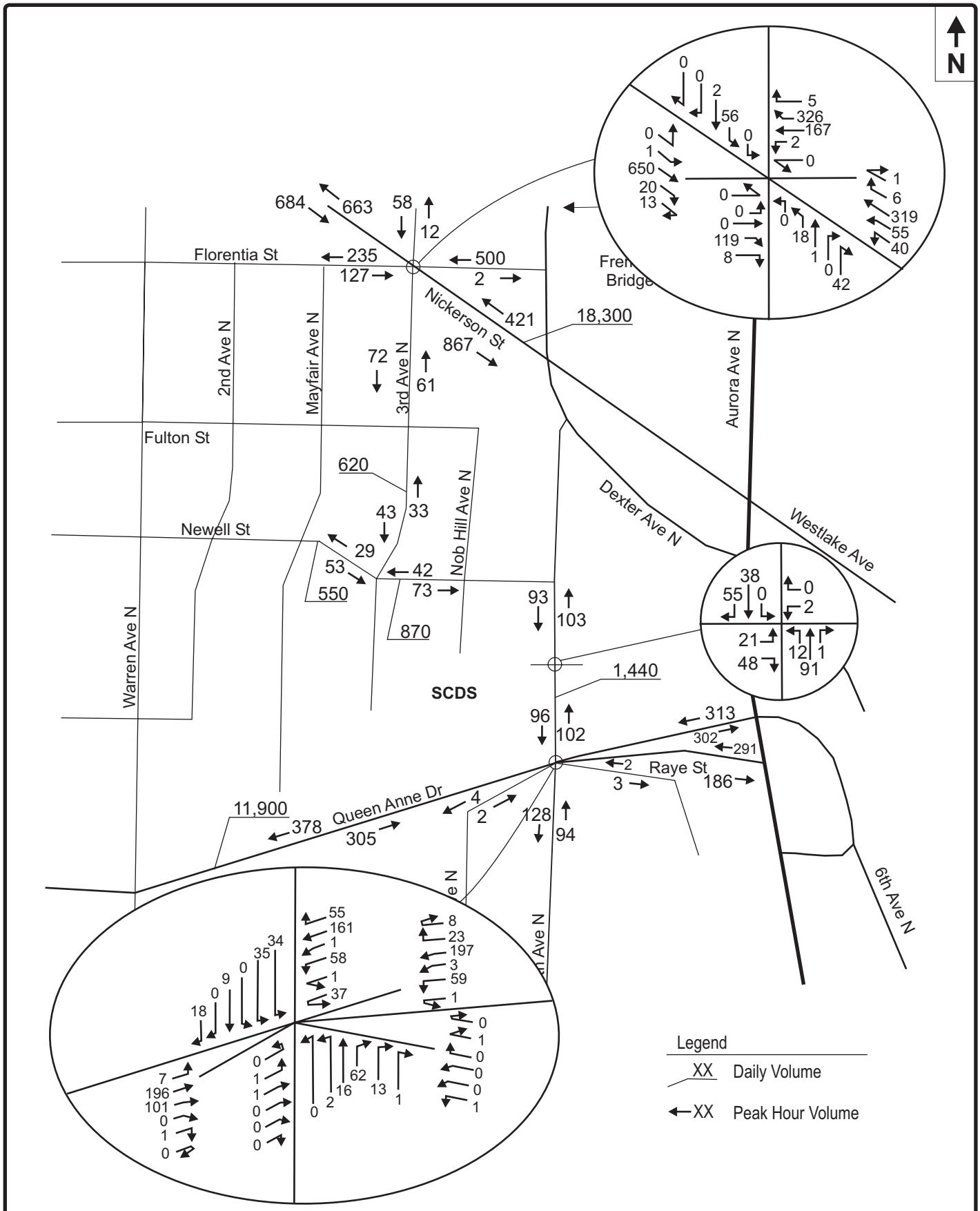


Figure 10

SEATTLE COUNTRY DAY SCHOOL EIS

EXISTING (2004)
DAILY AND SCHOOL PM PEAK HOUR
TRAFFIC VOLUMES

heffron transportation, inc.

As previously discussed, two future years were evaluated for this project: year 2006 and year 2010. To estimate future year 2006 and 2010 traffic conditions without the proposed project, a compound annual growth rate was applied to existing traffic volumes at study area intersections and roadways. The following describes the future year traffic forecasting method.

A single growth rate for all intersections in the study area was developed based on historical traffic counts performed by the City of Seattle from 1991 to 2003. Over this 12-year period, traffic on the study area arterials either did not grow or declined slightly. Historical counts on local access roads in the study area were available at two locations—3rd Avenue N, south of Nickerson Street and Florentia Street, west of 3rd Avenue N. The counts on 3rd Avenue N, south of Nickerson Street, show that peak hour traffic has not increased between 1994 and 2003. Counts on Florentia Street, west of 3rd Avenue N, show that peak hour traffic volumes have increased by about 0.8% per year. To be conservative, a 1% compound annual growth rate was applied to all existing 2004 volumes. The growth rate is intended to account for increases in traffic passing through the study area and traffic generated by developments that have not yet applied for permits or are unknown at this time.

The City of Seattle's Department of Planning and Development (DPD) was contacted to determine if any other projects proposed in the study area should be considered separately as part of the future traffic forecasts. The City indicated that project trips from *Seattle Pacific University Major Institution Master Plan* and SCDS' planned reorganization should also be added to the background traffic volumes. DPD staff indicated that the 1% annual growth rate and the two planned projects would adequately account for potential future development for the two future analysis years.

Figures 11 and 12 show the forecast 2006-without-project AM and School PM peak hour traffic volumes, respectively. Figures 13 and 14 show the forecast 2010 without-project AM and School PM peak hour traffic volumes, respectively. These traffic volumes include growth associated with SCDS' planned reorganization and background traffic. As will be described later, the forecast 2006 and 2010 traffic volumes also represent future conditions with the No Action Alternative.

Neighborhood Access Street Traffic

According to Seattle Department of Transportation (SDOT), daily volumes in excess of 1,000 vehicles on roadways classified as "access streets" can indicate that unusual conditions exist, such as a high amount of cut-through traffic. As shown in Figures 11 thru 14, Newell Street and 3rd Avenue N near SCDS currently have daily traffic volumes less than 1,000, and are expected to remain under this threshold in 2006 and 2010 without the proposed project. 4th Avenue N, south of SCDS, has an existing daily volume of 1,440. This volume is expected to grow to 1,510 and 1,570 in 2006 and 2010 without the project, respectively. This section of 4th Avenue N provides direct access to SCDS and the condominium complex located across the street. It is possible that daily volumes on the section of 4th Avenue N between the school and Newell Street, and on Newell Street, between Nob Hill Avenue N and 4th Avenue N, also exceed 1,000 daily vehicles due to circulation effects around the school.

Fremont Bridge Construction Traffic

As noted previously in *Roadway Network,* reconstruction of the Fremont Bridge could cause temporary traffic volume increases within the study area traffic. SDOT is currently evaluating improvement options to help reduce the temporary impacts due to the bridge construction. However, there are currently no specific improvement plans identified within the project study area. Because no specific improvements are proposed, and because the potential increase in traffic volume would be temporary, these traffic increases were not specifically considered in this analysis.

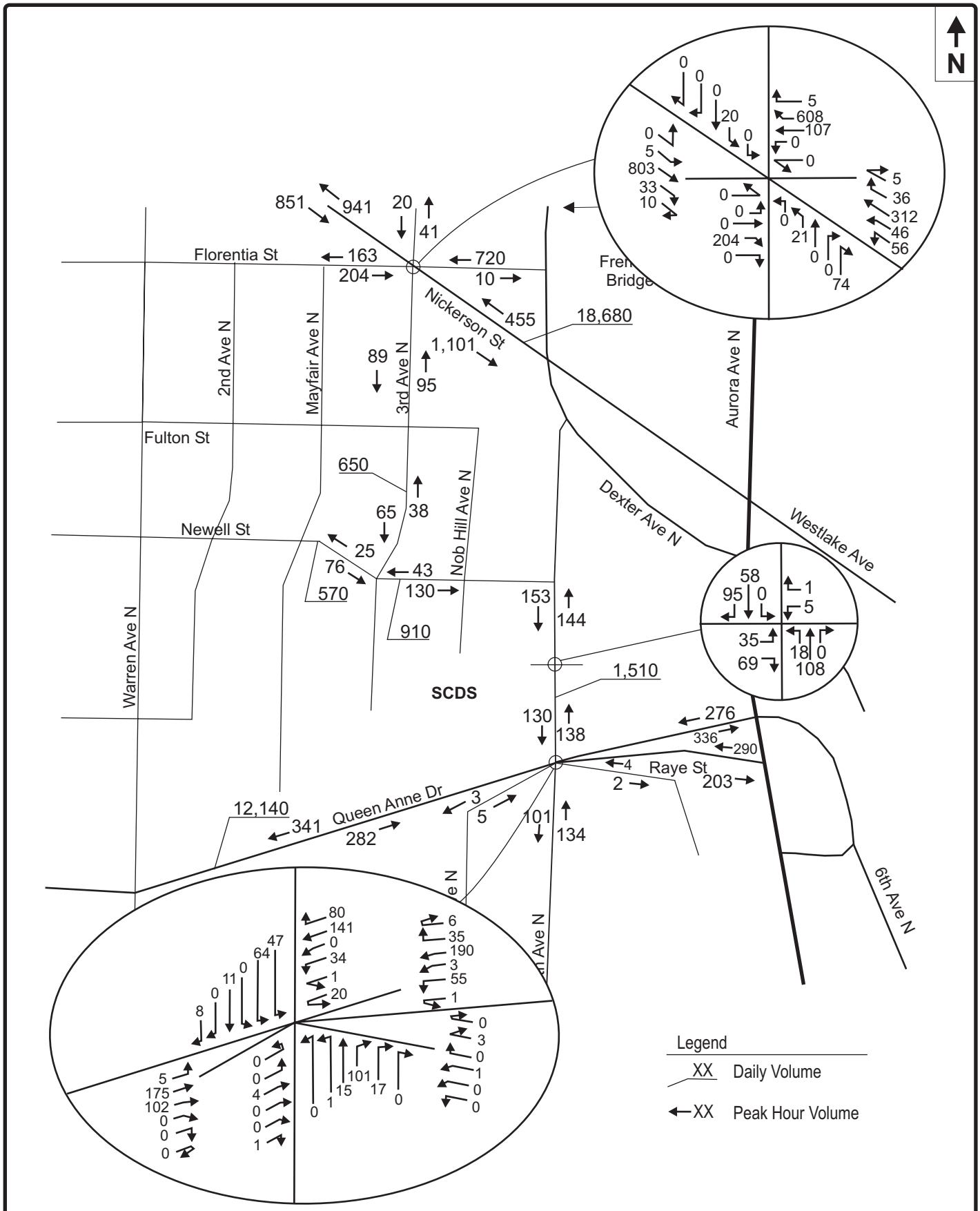


Figure 11

SEATTLE COUNTRY DAY SCHOOL EIS

2006 NO ACTION
DAILY AND AM PEAK HOUR
TRAFFIC VOLUMES

heffron transportation, inc.

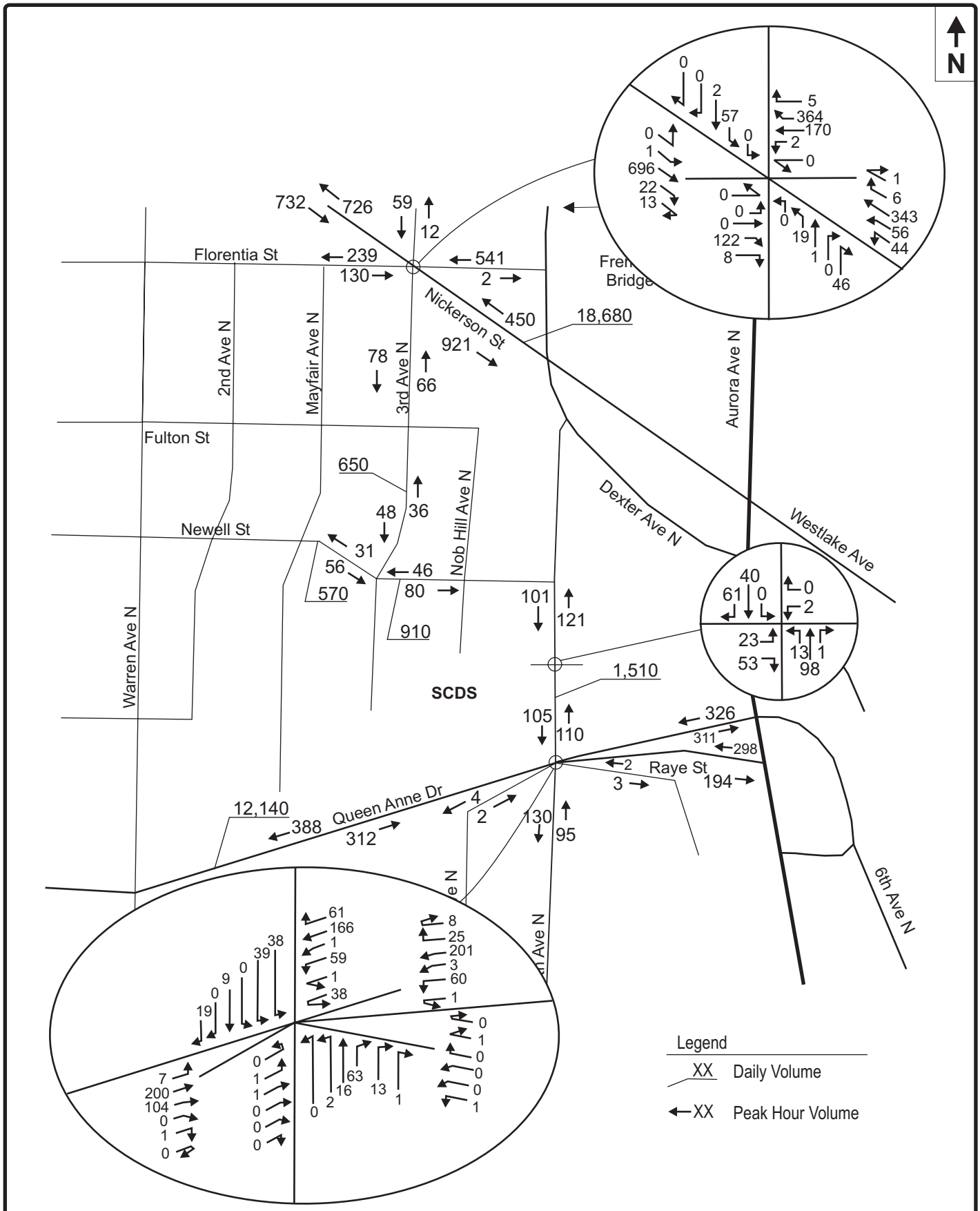


Figure 12

SEATTLE COUNTRY DAY SCHOOL EIS

2006 NO ACTION
DAILY AND SCHOOL PM PEAK HOUR
TRAFFIC VOLUMES

heffron transportation, inc.

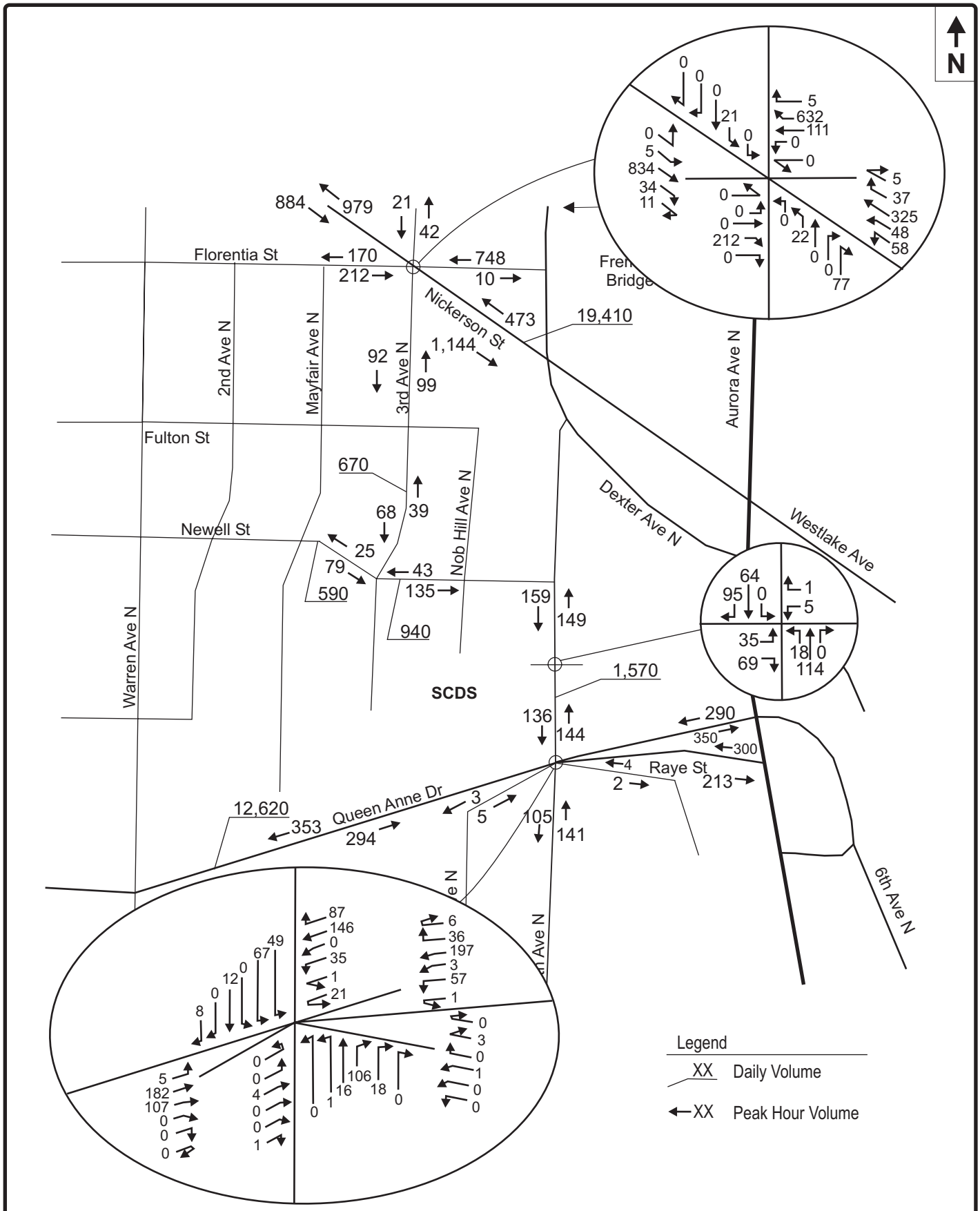


Figure 13

SEATTLE COUNTRY DAY SCHOOL EIS

2010 NO ACTION
DAILY AND AM PEAK HOUR
TRAFFIC VOLUMES

heffron transportation, inc.

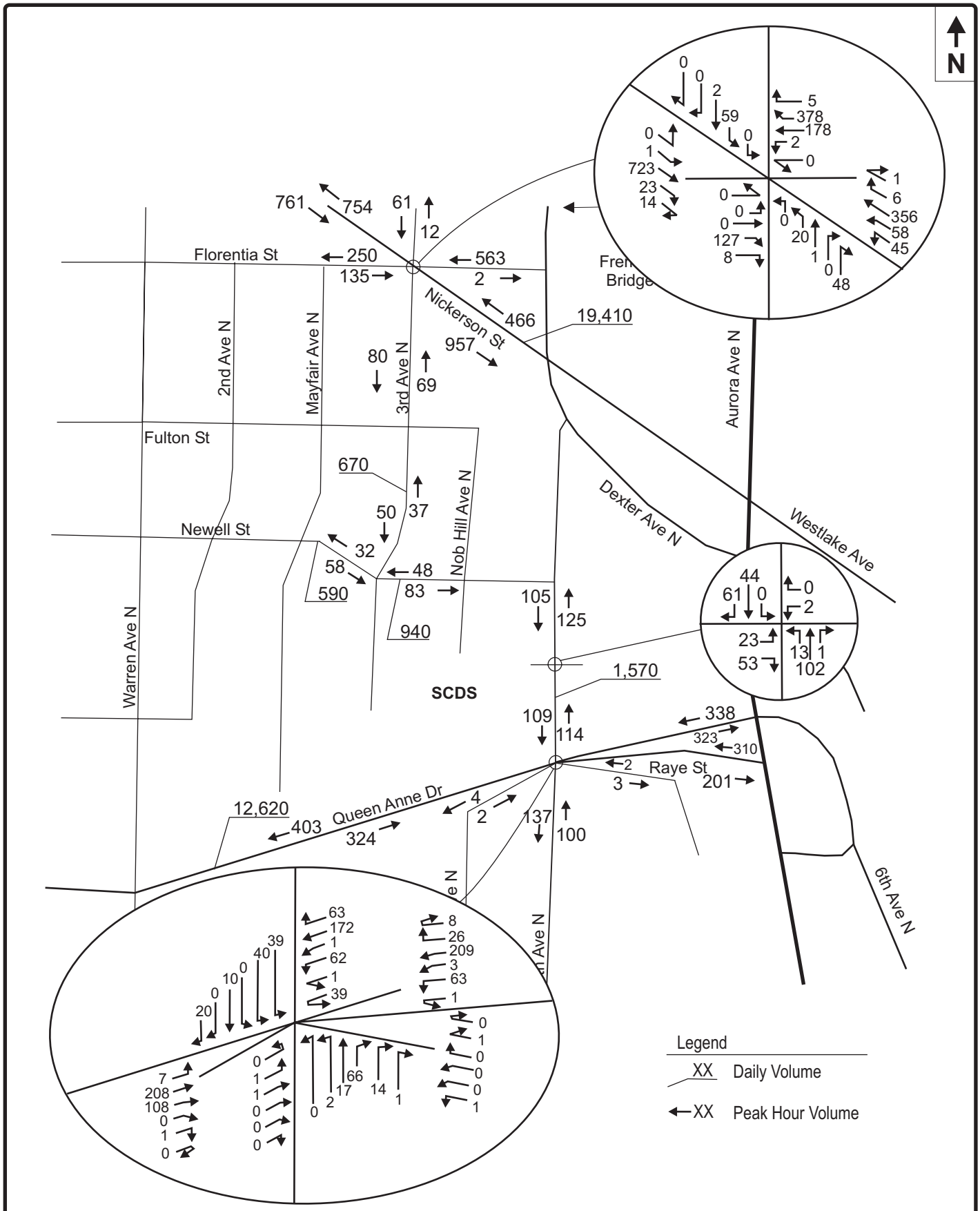


Figure 14

SEATTLE COUNTRY DAY SCHOOL EIS

2010 NO ACTION
DAILY AND SCHOOL PM PEAK HOUR
TRAFFIC VOLUMES

heffron transportation, inc.

Comparison of School Trips to Total Traffic Volumes

SCDS currently generates trips that travel on adjacent access streets and through nearby arterial intersections. Table 6 shows the percentage of SCDS-related trips compared to the total traffic volume through the study area intersections and on adjacent roadways during the AM and School PM peak hour. As shown, SCDS trips account for between 6% and 90% of the total traffic volumes during the AM peak hour, and between 6% and 86% of the total traffic volumes during School PM peak hour. The highest percentages occur on the access streets located adjacent to SCDS and on the main access routes to and from school. The lowest percentages occur at the nearby arterial intersections.

Table 6. Existing SCDS Trips as a Percentage of Total Traffic Volumes

Location	Total Traffic Volumes	Existing SCDS Trips	% SCDS Trips
AM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,084	230	21%
Nickerson/3rd Ave N/Florentia St Intersection	2,210	128	6%
4th Avenue N, south of SCDS	245	221	90%
Newell St, east of 3rd Ave N	162	111	69%
Newell St, west of 3rd Ave N	98	37	38%
3rd Ave N, north of Newell St	95	74	78%
School PM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,103	181	16%
Nickerson/3rd Ave N/Florentia St Intersection	1,851	107	6%
4th Avenue N, south of SCDS	198	163	82%
Newell St, east of 3rd Ave N	115	99	86%
Newell St, west of 3rd Ave N	82	38	46%
3rd Ave N, north of Newell St	76	61	80%

Source: Heffron Transportation, Inc.

Both total traffic volumes and SCDS trips could increase by 2006 without the proposed redevelopment project due to background traffic growth and SCDS' planned reorganization. The SCDS trip percentages would stay approximately the same with the 2006-without-project condition. These percentages are shown in Table 7.

Table 7. 2006 No-Action SCDS Trips as a Percentage of Total Traffic Volumes

Location	Total Traffic Volumes	Existing SCDS Trips	% SCDS Trips
AM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,121	249	22%
Nickerson/3rd Ave N/Florentia St Intersection	2,345	139	6%
4th Avenue N, south of SCDS	268	240	90%
Newell St, east of 3rd Ave N	173	119	69%
Newell St, west of 3rd Ave N	101	39	39%
3rd Ave N, north of Newell St	103	80	78%
School PM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,140	195	17%
Nickerson/3rd Ave N/Florentia St Intersection	1,978	116	6%
4th Avenue N, south of SCDS	215	176	82%
Newell St, east of 3rd Ave N	126	108	86%
0Newell St, west of 3rd Ave N	87	41	47%
3rd Ave N, north of Newell St	84	67	80%

Source: Heffron Transportation, Inc.

In 2010 without the proposed redevelopment project, total traffic volumes could continue to grow, but, according to SCDS administrators, student enrollment is not planned to increase. Based on this assumption, SCDS trips in 2010 without the project would be the same as the 2006-without-project condition. Since background traffic volumes are expected to increase, but SCDS trips would remain the same, SCDS trip percentages would be slightly reduced in 2010 without the proposed redevelopment project as shown in Table 8.

Table 8. 2010 No-Action SCDS Trips as a Percentage of Total Traffic Volumes

Location	Total Traffic Volumes	Existing SCDS Trips	% SCDS Trips
AM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,254	249	20%
Nickerson/3rd Ave N/Florentia St Intersection	2,437	139	6%
4th Avenue N, south of SCDS	280	240	86%
Newell St, east of 3rd Ave N	178	119	67%
Newell St, west of 3rd Ave N	104	39	38%
3rd Ave N, north of Newell St	107	80	75%
School PM Peak Hour			
Queen Anne Dr/4th Ave N/Raye St Intersection	1,185	195	16%
Nickerson/3rd Ave N/Florentia St Intersection	2,055	116	6%
4th Avenue N, south of SCDS	223	176	79%
Newell St, east of 3rd Ave N	131	108	82%
Newell St, west of 3rd Ave N	90	41	46%
3rd Ave N, north of Newell St	87	67	77%

Source: Heffron Transportation, Inc.

Comparison of Additional Traffic Counts

Per the request of the City of Seattle, three-day traffic counts were performed in the vicinity of SCDS beginning Tuesday, April 13 through Thursday, April 15, 2004 when SCDS students were on Spring Break. These counts reflect average traffic conditions when SCDS is not in session. These counts were compared to traffic counts obtained for this project when SCDS was in session to assess whether or not the assignment of existing SCDS trips used in this report is reasonable. It should be noted that the difference between the two counts should not necessarily be assumed to be due solely to school-related trips, since there are many factors that account for traffic volumes on any given day. For example, background traffic volumes on the vicinity streets may have been lower than usual during Spring Break, which would make the school-related trips appear higher than actual. Likewise, if background traffic volumes on the vicinity streets were higher than usual, the school-related traffic volumes would appear lower than actual. Even though the comparison cannot provide proof of school-related trip generation, it can provide a general reflection of traffic volumes near the school with and without SCDS in session.

Table 9 shows the daily, AM peak hour, School PM peak hour, and Commuter PM peak hour volumes with and without SCDS in session at three locations:

1. 4th Avenue N, north of Queen Anne Drive,
2. Newell Street, west of 3rd Avenue N,
3. 3rd Avenue N, north of Newell Street.

The first column shows the traffic count location, and the second and third columns indicate the traffic volumes with and without SCDS in session. The fourth column shows the change in the traffic volume between columns 2 and 3. The fifth column indicates the number of estimated SCDS trips assigned to that specific location, and the sixth column shows the difference between the change in traffic volumes (column 4) and the estimated SCDS trips (column 5) at each location.

The total change in traffic volumes at the three count locations was less than the total SCDS trip estimates for all conditions, except for the Commuter PM peak hour. For example, the daily change in volume at the three locations totaled 646 vehicles, but the analysis included in this report assumed a total of 801 existing SCDS trips at these locations. The assignment during the Commuter PM peak hour was nearly identical to the difference between the Spring Break and non-Spring Break counts.

Although the total existing SCDS trips at the three count locations were higher than the total change in traffic volumes, the number of SCDS trips assigned to 4th Avenue N was consistently higher than the change in traffic volumes at that location for all time periods, and the number of SCDS trips assigned to Newell Street was consistently lower than the change in traffic volumes at that location. The number of SCDS trips assigned to 3rd Avenue N was very similar to the change in traffic volumes at that location for all time periods. This information could suggest that the number of existing SCDS trips assumed to be using (assigned to) 4th Avenue N may be higher than actual, and the number of existing SCDS trips assigned to Newell Street may be lower than actual. If this is true, then the number of existing SCDS trips currently traveling through the neighborhood on Newell Street and Warren Avenue N may be higher than presented in this report. If the difference between the two traffic counts was assumed to be due solely to SCDS, then about 60 additional school trips could currently be traveling on Newell Street (west of 3rd Avenue N) and Warren Avenue N over the course of a day. About 32 of those trips could be traveling in the AM peak hour and about 19 of those trips could be traveling in the School PM peak hour. The number of school trips traveling on this route during the Commuter PM peak hour would be essentially the same as described in this report.

Table 9. Comparison of Traffic Volumes With and Without SCDS

Location	Traffic Volume with SCDS in session	Traffic Volume with SCDS on Spring Break	Change in Volume	Estimated SCDS Trips	Difference
Daily Volumes					
4th Avenue, north of Queen Anne Dr	1,443	1,153	290	508	218
Newell Street, west of 3rd Avenue	551	401	150	91	-59
3rd Avenue, north of Newell Street	619	413	206	202	-4
Total	2,613	1,967	646	801	155
AM Peak Hour Volumes					
4th Avenue, north of Queen Anne Dr	229 [a]	78	151	221	70
Newell Street, west of 3rd Avenue	98	29	69	37	-32
3rd Avenue, north of Newell Street	95	24	71	74	3
Total	422	131	291	332	41
School PM Peak Hour Volumes					
4th Avenue, north of Queen Anne Dr	152 [a]	65	87	163	76
Newell Street, west of 3rd Avenue	82	25	57	38	-19
3rd Avenue, north of Newell Street	76	28	48	61	13
Total	310	118	192	262	70
Commuter PM Peak Hour Volumes					
4th Avenue, north of Queen Anne Dr	135	106	29	29	0
Newell Street, west of 3rd Avenue	45	38	7	5	-2
3rd Avenue, north of Newell Street	59	43	16	13	-3
Total	239	187	52	47	-5

Source: Trafficount, Inc. Counts with SCDS in session were performed on February 3, 4, and 5, 2004. Counts with SCDS on Spring Break were performed on April 13, 14, and 15, 2004.

a. Traffic volume based on actual count. Corresponding traffic volumes on Figures 9 and 10 are slightly higher to reflect balanced volumes between SCDS and the Queen Anne Drive/4th Avenue N/Raye Street intersection.

It should be noted that assigning a higher number of SCDS trips to Newell Street rather than 4th Avenue N would not change any conclusions in this report. It could increase the percentage of SCDS trips on Newell Street described in Table 6, 7, and 8, but the percentage of SCDS trips would not be higher than the percentage of trips on 4th or 3rd Avenues N. Also, as described in subsequent sections, SCDS is proposing to add a new private access drive that would be accessible from both the north and south on 4th Avenue N with the project. This improvement is expected to shift some drivers that currently circulate through the neighborhood to access the end of the queue back to 4th Avenue N. If there are more SCDS trips currently circulating through the neighborhood, the proposed access drive could shift more existing trips than previously expected, thus creating a larger net reduction in trips on Newell Street.

2.3. Traffic Operations

The quality of traffic flow is defined by level of service (LOS). Levels of service are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delay. LOS D is acceptable within the City of Seattle. The existing traffic operating conditions in the study area were analyzed using the methodologies in the *Highway Capacity Manual 2000* (Transportation Research Board Special Report 209, 2000). All level of service analyses were performed using the *Synchro 5.0* analysis software, which is widely used by the City of Seattle for evaluating traffic operations. The traffic signal timing at the Nickerson Street/3rd Avenue N/Florentia Street intersection (including cycle lengths, and phase splits) was provided by the City of Seattle. The Queen Anne Drive/4th Avenue N/Raye Street intersection was analyzed using the *Synchro* model developed for the Fremont Bridge Reconstruction project.

Table 10 summarizes the levels of service during the AM and School PM peak hours, respectively. Both study area intersections currently operate at LOS C during both peak hours. It should be noted that the Queen Anne Drive/4th Avenue N/Raye Street intersection likely operates with more delay than described in the following tables. Although there are seven legs at this intersection, the *Synchro* software limits the number of legs for an all-way stop intersection to four. Therefore, the traffic volumes were combined to account for all trips traveling through the intersection during the peak hours. However, the delay per vehicle is likely higher due to the increased number of movements at the intersection and the hesitation involved with determining which vehicle should proceed at the multi-leg intersection. In addition, the majority of the traffic going through this intersection is on just three of the seven legs, which results in unbalanced flow. Congestion and long queues can form on those legs where most of the traffic occurs since they are processed at the same rate through the intersection as the minor movements. Even though the overall intersection is calculated to operate at LOS C, some of the approaches may operate over capacity (LOS F).

Growth in background traffic is expected to degrade operations at the Nickerson Street/3rd Avenue N/Florentia Street intersection from LOS C to LOS D during the AM peak hour. Growth in AM peak hour background traffic at the Queen Anne Drive/4th Avenue N/Raye Street intersection could add an average of 2.3 seconds of delay per vehicle in 2006 without the project, and an average of 6.7 seconds of delay per vehicle in 2010. Similar increases in delay would be expected in the School PM peak hour.

Table 10. Level of Service – Existing and Future-Without-Project (No Action) Conditions

	Existing			2006-Without-Project			2010-Without-Project		
Signalized Intersection	LOS [1]	Delay [2]	v/c [3]	LOS	Delay	v/c	LOS	Delay	v/c
Nickerson St/3rd Ave N/Florentia St									
AM Peak Hour	C	31.3	0.87	D	36.0	0.90	D	38.8	0.90
PM Peak Hour	C	26.1	0.80	C	28.0	0.83	C	30.0	0.87
All-way Stop Intersection	LOS		Delay	LOS		Delay	LOS		Delay
Queen Anne Dr/4th Ave N/Raye St									
AM Peak Hour	C		20.7	C		23.0	D		27.4
PM Peak Hour	C		21.4	C		23.7	D		27.8

Source: Heffron Transportation, Inc.

1. *Level of service*
2. *Average seconds of delay per vehicle.*
3. *Maximum volume-to-capacity ratio*

2.4. Drop-off and Pick-up Operations

SCDS' existing drop-off and pick-up area is located on 4th Avenue N in front of the school's main entrance. The area consists of a loop that can accommodate approximately seven vehicles at one time. The school day starts at 7:00 A.M. for the extended day program, 8:15 A.M. for students in grades 6 through 8 and at 8:30 A.M. for students in grades K through 5. During a field observation performed on June 12, 2003, some drivers were observed arriving at the school prior to 8:00 A.M. Most of these drivers appeared to be teachers and staff or parents with students in the extended day program. Most parents were observed dropping off students between 8:00 and 8:30 A.M.

Parents arrive from the south on 4th Avenue N, from the west on Newell Street, and from the north on Nob Hill Avenue, 3rd Avenue N, and 4th Avenue N. Based on survey results, parents arrive about equally from the north and south, with a higher percentage (60%) leaving the site to the south on 4th Avenue N. This is consistent with field observations. Based on counts performed at the site driveways, about 55% of parents use the drop-off loop on 4th Avenue N in the morning. Most parents using the loop on 4th Avenue N to drop off their children arrive from the north and turn right directly into the loop. Some parents arriving from the south turn left into the loop. However, when the loop is full, parents proceed north on 4th Avenue N, turn around at the end of the street, and queue southbound on 4th Avenue N to wait to access the loop. On the observation day in June 2003, the peak morning queue on the observation day occurred at 8:15 A.M. and again at 8:25 A.M. and consisted of about 12 vehicles (7 vehicles in the drop-off loop and 5 vehicles on 4th Avenue N). This queue extended north to about the school's northernmost driveway. The morning queue on 4th Avenue N dissipated by 8:30 A.M.

About 45% of parents park on street, and walk their children to school in the morning. Because parking is allowed on both sides of the roadway on Nob Hill Avenue, Newell Street, and 4th Avenue N, the roadways are effectively reduced to a single travel lane when heavily parked, which causes congestion. On the observation day, congestion—which involved vehicles having to wait while other vehicles traversed these streets—occurred between about 8:00 and 8:30 A.M.

The school day at SCDS ends at 2:50 P.M. for K through 3 students and at 3:10 P.M. for students in grades 4 through 8. During a field observation performed on March 5, 2003, parents were observed arriving at the school to pick up their children around 2:30 P.M. Similar to the morning, parents were observed arriving from the south on 4th Avenue N, from the west on Newell Street, and from the north on Nob Hill Avenue. Based on survey results, about 45% of parents arrive from the south, with the remaining 55% arriving from the north and west. Based on counts performed at the site driveways, about half of parents use the pick-up loop on 4th Avenue N in the afternoon. This is consistent with field observations. During afternoon pick up, drivers are supposed to enter the pick-up loop from the north only. This causes some parents to circulate through the neighborhood to get in queue from the north. The peak afternoon queue on the March 2003 observation day occurred at 2:50 P.M. for the first student release and totaled 20 queued vehicles—seven on site, 11 vehicles to the north on 4th Avenue, and two vehicles to the west on Newell Street. By 3:05 P.M., the overall peak afternoon queue of 30 vehicles was observed (seven vehicles on site, 11 vehicles to the north on 4th Avenue, and 12 vehicles to the west on Newell Street). The queue on Newell Street extended west past Nob Hill Avenue. Because there were parked vehicles on both sides on Newell Street, the queue occurred in the single travel lane which blocked the roadway until about 3:20 P.M. By 3:30 P.M., the queue had reduced to about 14 vehicles (7 vehicles on site, and 7 vehicles on 4th Avenue N), and the on-street queue dissipated by about 3:35 P.M. Since the March 2003 observation, parking on the south side of Newell Street adjacent to the two houses closest to 4th Avenue N has been signed for no parking between 2:00 and 4:00 P.M. This change was instituted to allow vehicles to queue on the south side of the roadway and leave the travel lane open for vehicles traveling on Newell Street. During an observation in February 2004, it was noted that drivers were using this space for afternoon queuing as desired. School-

related vehicles contributed to congestion along this section of Newell Street; however, Newell Street was not observed to be blocked as it was in March 2003 during the afternoon pick-up time period.

In the 2006 and 2010 without the proposed project, the number of vehicles in queue could increase if student enrollment increases from 303 to 328 with the planned reorganization. Because the number of vehicles entering the pick-up loop in the afternoon is near or at the maximum service rate, the additional vehicles generated with the planned reorganization are expected to add directly to the existing queue. Assuming the percentage of parents using the pick-up loop in the afternoon would remain the same as existing conditions (about 50%); the peak queue could increase by seven to about 37 vehicles with the planned reorganization.

2.5. Site Access

SCDS has four access driveways located on 4th Avenue N. The southernmost driveway serves a parking lot with 15 parking spaces, the two center driveways serve the drop-off/pick-up loop and ten parking spaces, and the northernmost driveway serves a small parking lot with four spaces behind the existing middle school building. All other access to the site occurs via sidewalks and stairways from the surrounding roadways. Pedestrian access occurs from both 4th and Nob Hill Avenue N.

There are no specific projects planned in the study area that will change the site access driveways by 2006 or 2010 without the project. Therefore, the future conditions without the project (No Action) assume the existing site access conditions.

2.6. Parking

SCDS Parking Demand and Supply

SCDS' peak parking demand during an average school day includes vehicles parked by faculty, staff, and visitors. According to school administrators, the school has approximately 30 visitors per day with about five visitors at any one time. Based on information provided in the transportation survey, the peak parking demand at SCDS on an average weekday is approximately 57 vehicles, as shown in Table 11. Note that this parking demand is associated with the peak parking demand that occurs during an average school day. Parking associated with the peak parent pick-up time period after school is described in the following section.

Table 11. Average Day Peak Parking Demand – Existing Conditions

	SOV	HOV driver	Total
Faculty/Staff	49	3	52
Visitors	5	0	5
Total	54	3	57

Source: SCDS Transportation Survey, 2003, and visitor information provided by SCDS.

As described previously, SCDS has 29 on-site parking spaces, of which 26 are available for faculty, staff, and visitor parking. The other three spaces are handicapped-accessible or reserved for the school's bus. Therefore, about 46% of SCDS' existing peak parking demand on an average day can be

accommodated on site. The remaining 31 school-related vehicles (57 vehicle demand less 26 parked on site) typically park on street near the site.

On-Street Parking Demand and Supply

Within the area, parking demand is also generated by local residents. Many residents whose homes face Newell Street have off-street parking in driveways, garages or both. However, residents throughout the surrounding neighborhood may also choose to park on street for convenience.

To document the current level of on-street parking activity in the area surrounding SCDS, an on-street parking utilization study was performed. The following describes the methodology used to determine the study area, existing on-street parking supply, existing parking demand, and existing on-street parking utilization.

The on-street parking utilization study area was determined based on the methodology described in the City of Seattle's Client Assistance Memorandum (CAM) #117. Although this CAM was originally prepared for accessory residential units, it is the methodology the City now uses for all land uses. The CAM defines the study area for a parking utilization study as "an area which is within a 400 foot *walking* distance of the subject property," although barriers such as major arterials and geographic features should be taken into consideration when defining the appropriate study area. The topography near the project site was evaluated and only the "practical" walking areas were included in the study area as shown on Figure 15, rather than the entire area within a 400-foot walking distance.

Several streets surrounding the school site within the study area allow parking including: 4th Avenue N. Newell Street, Nob Hill Avenue N, 3rd Avenue N, Queen Anne Drive, Raye Street, and Halladay Street.

The on-street parking supply within the study area was determined based on the methodology described in CAM #117. The study area was separated into individual block faces. A block face consists of one side of a street between two cross-streets. For example, the west side of 4th Avenue between Newell street and Queen Anne Drive is one block face. Each block face was analyzed to determine the number of available on-street parking spaces. First, all common street features—such as driveways, fire hydrants, and special parking zones—were noted.

Second, certain distances adjacent to the common street features were noted. No on-street parking was assumed within 30 feet of a signalized or unsignalized intersection, 20 feet of an uncontrolled intersection, 15 feet on either side of a fire hydrant, or five feet on either side of a driveway or alley. The remaining unobstructed lengths of street, between street features, were converted to legal on-street parking spaces using information in Table 12.

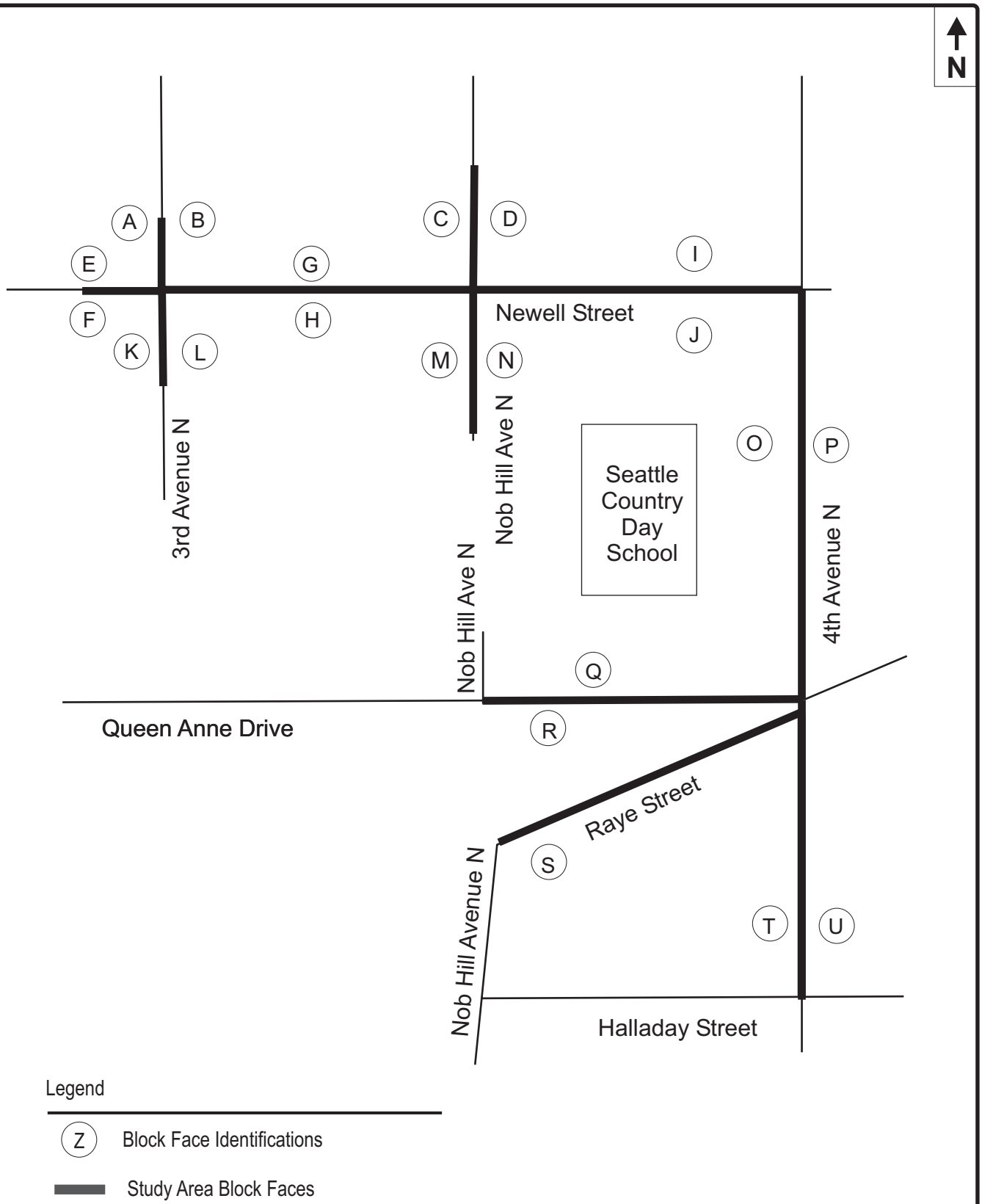


Figure 15

SEATTLE COUNTRY DAY SCHOOL EIS

STUDY AREA FOR ON-STREET PARKING UTILIZATION SURVEY

heffron transportation, inc.

Table 12. Number of Legal On-Street Parking Spaces

Unobstructed Distance	Number of Parking Spaces	Unobstructed Distance	Number of Parking Spaces	Unobstructed Distance	Number of Parking Spaces
0 – 15 feet	0	206 – 221 feet	11	412 – 433 feet	22
16 – 31 feet	1	222 – 243 feet	12	434 – 449 feet	23
32 – 53 feet	2	244 – 259 feet	13	450 – 471 feet	24
54 – 69 feet	3	260 – 281 feet	14	472 – 487 feet	25
70 – 91 feet	4	282 – 297 feet	15	488 – 509 feet	26
92 – 107 feet	5	298 – 319 feet	16	510 – 525 feet	27
108 – 129 feet	6	320 – 335 feet	17	526 – 547 feet	28
130 – 145 feet	7	336 – 357 feet	18	548 – 563 feet	29
146 – 167 feet	8	358 – 373 feet	19	564 – 585 feet	30
168 – 183 feet	9	374 – 395 feet	20	586 – 601 feet	31
184 – 205 feet	10	396 – 411 feet	21	602 – 623 feet	32

Source: City of Seattle, CAM #117. The numbers of parking spaces for unobstructed lengths over 319 feet were derived by Heffron Transportation using the City's methodology.

Using the methodology described above, there were a total of 100 on-street parking spaces within the study area. Most on-street spaces are for parallel parking; however, 12 are for angle parking. Six (6) striped angle parking spaces are located on 4th Avenue N in front of the school, and approximately six (6) additional angle spaces are located on 3rd Avenue N south of Newell Street. The angle spaces on 3rd Avenue N are not striped; therefore, the number of angle parking spaces was estimated assuming 10 linear feet per space. Summaries of the on-street parking supply per block face are included in the Appendix. Since the on-street parking survey was performed, signs prohibiting parking on the south side of Newell Street adjacent to 4th Avenue N were installed. These signs remove one legal parking space from this section of Newell Street, and reduce the total on-street parking supply during the afternoon time period to 99 parking spaces. This change is reflected in the following tables and in the tables included in the Appendix.

On-street parking demand was surveyed within the study area for three weekday time periods—at noon, at 3:00 P.M. (mid-afternoon) and at 7:30 P.M. (evening). The noon time period represents a time when most school teachers, staff, and visitors are on site. The mid-afternoon time represents the peak parking demand when parents pick up students from school. The evening period represents the typical parking demand in the neighborhood when residents have returned home from work.

Parking surveys were conducted on Wednesday, March 5, 2003 and Thursday, March 6, 2003. The number of vehicles parked for each time period and survey day are summarized in Table 13. Summaries of the on-street parking demand results for each block face are included in the Appendix.

Table 13. 2003 On-Street Parking Demand Survey Results

Time Period Surveyed	Parking Supply	Total Number of Vehicles Parked	% Utilization
Weekday, Noon			
Wednesday, March 5, 2003	100	42	42%
Thursday, March 6, 2003	100	51	51%
Average Weekday	100	*47*	*47%*
Weekday, 3:00 PM			
Wednesday, March 5, 2003	99	71	72%
Thursday, March 6, 2003	99	85	86%
Average Weekday	*99*	*78*	*79%*
Weekday, 7:30 PM			
Wednesday, March 5, 2003	100	46	46%
Thursday, March 6, 2003	100	44	44%
Average Weekday	100	*45*	*45%*

Source: Heffron Transportation, 2004

On-street parking utilization was calculated using the methodology described in CAM #117 and is shown in Table 13. Parking utilization is the average number of on-street parked vehicles divided by the number of legal on-street parking spaces within the study area. As described above, the legal on-street parking supply within the study area is 100 spaces during the noon and evening time periods, and 99 spaces in the mid-afternoon time period.

As expected, the highest on-street parking utilization in the vicinity of SCDS occurs during the mid-afternoon when parents arrive to pick up students. It should be noted that, although the overall study-area parking utilization averaged 79%, parking utilization along streets closest to SCDS was much higher. In some cases, parking demand along segments of these roadways exceeded the legal supply identified earlier in this report. For example, utilization for on-street parking along the south side of Newell Street was 200% during the mid-afternoon time period, which indicates that many vehicles were parked illegally such as too close to driveways or in restricted areas. However, parking demand along several of the roadways within the study area, such as 3rd Avenue N, was well below the legal supply.

In the 2006 and 2010 without the proposed project, the SCDS' parking demand could increase with the planned reorganization due to the five staff that could be hired. The number of visitors on site at any one time is not expected to increase in the future. As shown in Table 14, SCDS' peak parking demand could increase to 62 vehicles in the future without the proposed project.

Table 14. Average Day Peak Parking Demand – Future-Without-Project Conditions

	SOV	HOV driver	Total
Faculty/Staff	54	3	57
Visitors	5	0	5
Total	59	3	62

Note: One parked vehicle was assumed for each SOV, HOV driver, and visitor.

There are no specific projects planned in the study area that would change the on-site or on-street parking supply in the future without the development proposal. Therefore, the future-without-project conditions assume the existing level of parking supply. Therefore, approximately 42% of SCDS' peak

parking demand on an average day could be accommodated on site in the future without the development proposal. The remaining 36 school-related vehicles (62 vehicle demand less 26 parked on site) would likely park on street near the site. These additional vehicles could increase the average on-street parking utilization in the noon time period by about 5% to 52%. In the peak afternoon time period, the school-related vehicles parked on-street would increase by the additional faculty/staff vehicles and by the additional parents coming to pick up their children. About half of the parents currently park to pick up their children, assuming this percentage would continue, about six additional parents could park during the peak afternoon time period. This would increase the total on-street parking demand during this time period by 10 vehicles (four faculty/staff vehicles, and six parent vehicles). This would increase the average on-street parking utilization in the peak afternoon time period by about 10% to 89%. The future-without-project condition would not change the evening parking utilization on an average day.

2.7. Charter Bus Operations

Charter buses are used to pick up and drop off SCDS students at the site for special off-site events and field trips. Bus pick up and drop off does not occur on site because the turning radius of the existing drop-off/pick-up loop is too small. Currently, buses typically stage in the eastbound travel lane on Newell Street or on Nob Hill Avenue N. Because of the narrow roadways, the charter buses can cause congestion or block travel on Newell Street and/or Nob Hill Avenue N while staging, loading, and unloading. According to SCDS staff, buses are currently chartered about 40 times per school year, or about four times per month.

In 2006 and 2010 without the proposed project, bus pick-up and drop-off would continue to occur as described for existing conditions. According to SCDS staff, the number of buses chartered is not expected to increase in the future without the proposed project, since only a portion of students use a charter bus each time. The 8% increase in students possible with the planned reorganization is not expected to exceed the current charter bus capacity.

2.8. Delivery Operations

There are approximately five deliveries per day at SCDS—one food delivery and four other general deliveries such as mail or office supplies. The food delivery occurs on Nob Hill Avenue N, and includes the truck backing southbound on Nob Hill Avenue N to deliver food to the school's kitchen. The other deliveries typically occur at the school's drop-off/pick-up loop in front of the school. No increase in deliveries is anticipated in 2006 or 2010 without the project.

2.9. Event Conditions

SCDS has approximately 35 special events each year with attendance ranging from about 12 persons for storytelling to about 400 persons for an annual chess match. The school hosts approximately 14 special evening/weekend events throughout the year that draw over 100 persons including:

- Chess Tournament (about 400 students/adults)
- Annual Concert (about 300 students/adults)
- Auction (about 350 adults)
- Graduation (about 350 adults/50 students)
- Crazy Carnival (about 200 students/100 adults)
- Fall Dance (about 225 students/10 adults)
- Winter Dance (about 225 students/10 adults)
- Spring Dance (about 225 students/10 adults)
- Admissions Open House (about 200 adults)
- 4-5 Open House (about 170 adults)
- Academic Open House (about 160 adults)
- New Family Social (about 150 adults/75 students)
- K-1 Academic Open House (about 140 adults)
- Middle School Open House (about 120 adults)

Because these events are typically held in the evenings, on weekends, or during the summer, they generally do not add to the school's peak hour traffic volumes or peak parking demand. Assuming an average vehicle occupancy rate of 2.0 persons per vehicle, the special events currently generate a peak parking demand in the range of 60 to 200 vehicles depending on the size of the event. There are currently 26 general-purpose parking spaces available on site and about 55 on-street parking spaces available in the evening (see Table 13). Therefore, parking generated by the larger events likely utilizes most parking spaces within the study area and extends farther into the surrounding neighborhood. These larger school events occur approximately once per month.

The school hosts one special event each year that occurs during a school day. The date of Grandparent's Day varies from year to year. It can occur in the morning or afternoon for about two hours. About 250 grandparents attend and most grandparents drive themselves to and from the event. Because this event occurs on a school day, the parking generated by this event is in addition to the typical parking demand on an average day. According to SCDS staff, this annual event generates the most parked vehicles of the school year, and school-related vehicles encompass all available parking in the study area, and extend into the surrounding neighborhood.

SCDS also hosts interscholastic middle school basketball games in late November thru early February, and again in early March thru mid-April. Up to 10 games occur on each Saturday and up to eight games on each Sunday. There are an estimated 50 attendees at each game in the first session of games (November – February) and about 30 attendees at each game in the second session of games (March – April). Attendees arrive in personal vehicles and park on site and in available on-street parking spaces.

According to SCDS staff, the frequency of special events at SCDS in 2006 and 2010 without the project is not expected to increase. However, the size of events could increase proportionally to the increase in student population (about 8%) that could occur with or without the proposal.

2.10. Safety

Traffic accident data were obtained from the City of Seattle along SCDS' main travel routes including:

- 4th Avenue N, between Queen Anne Drive and Newell Street
- Newell Street, between Warren and 4th Avenues N
- 3rd Avenue N, between Nickerson and Newell Streets
- Warren Avenue N, between Queen Anne Drive and Newell Street

The accident data included the period between January 1, 2000 and December 31, 2002 (three years). Signalized intersections with 10 or more accidents per year and unsignalized intersections with five or more accidents per year are considered high accident locations by the City of Seattle. Table 15 summarizes the average annual accidents at each intersection and midblock section. None of the study

area intersections met or exceeded the City's high accident threshold during any of the three years evaluated.

There were a total of two (2) accidents involving bicyclists and one (1) involving a pedestrian. All three accidents occurred at the Nickerson Street/Florentia Street/3rd Avenue N intersection—two blocks north of the school.

There is no way to accurately forecast accident experience for future year 2006 or 2010 conditions without the project (No Action). However, growth in background traffic can result in a proportional increase in accident experience.

Table 15. Intersection Accident Summary (1/1/00 - 12/31/02)

	Type of Accident (Totals for Three Years)								Accidents by Year			
Signalized Intersection	Head-On	Rear-End	Side-Swp	Right Turn	Left-Turn	Right Angle	Peds/ Bicycle	Other	2000	2001	2002	Ave/Yr
Nickerson St/Florentia St/3rd Ave N	0	3	1	0	2	5	3	0	4	6	4	4.7
Unsignalized Intersection	Head-On	Rear-End	Side-Swp	Right Turn	Left-Turn	Right Angle	Peds/ Bicycle	Other	2000	2001	2002	Ave/Yr
Queen Anne Dr/4th Ave N/Raye St	0	0	0	0	1	2	0	1 [a]	1	1	2	1.3
4th Ave N/Newell St	0	0	0	0	0	0	0	1 [b]	0	0	1	0.3
Queen Anne Dr/Warren Ave N	0	0	0	0	0	1	0	0	0	0	1	0.3
3rd Ave N/Newell St	0	0	0	0	0	0	0	0	0	0	0	0
Warren Ave N/Newell St	0	0	0	0	0	0	0	0	0	0	0	0
3rd Ave N/Fulton St	0	0	0	0	0	0	0	0	0	0	0	0
Roadway Segment	Head-On	Rear-End	Side-Swp	Right-Turn	Left-Turn	Right-Angle	Peds/ Bicycle	Other	2000	2001	2002	Ave/Yr
Warren Ave N bwtn Queen Anne Dr and Newell St	0	0	0	0	0	0	0	3 [c]	0	0	3	1.0
Newell St btwn 4th Ave and Warren Ave	0	0	0	0	0	0	0	1 [d]	0	0	1	0.3
3rd Ave N btwn Newell Street and Nickerson Street	0	0	0	0	0	0	0	1 [e]	1	0	0	0.3
4th Ave N btwn Queen Anne Dr and Newell St	0	0	0	0	0	0	0	0	0	0	0	0.0

Source: City of Seattle, 2004

a. No diagram was available for this collision.

b. A northbound vehicle collided with a vehicle backing up at the 4th Avenue N/Newell Street intersection.

c. All accidents involved collisions with parked vehicles.

d. An eastbound vehicle struck the side of a stopped vehicle on Newell Street between 3rd and Nob Hill Avenues N.

e. A parked vehicle on 3rd Avenue N between Fulton and Florentia Streets was involved in a hit-and-run collision.

2.11. Transit Facilities and Service

King County/Metro provides transit service within the site study area. Bus stops exist on Queen Anne Drive, Dexter Avenue, and Aurora Avenue. There are bus stops on the north and south sides of Queen Anne Drive, near 2nd Avenue N. These bus stops serve King County Metro Routes 45 and 82. There are four bus stops on Dexter Avenue north of the study area. Two stops (one for each direction) are located near 4th Avenue N and two (also one for each direction) are located near Westlake Avenue N.

These bus stops serve Metro Routes 17, 26, 28, and 74. There is also a bus stop on northbound Aurora Avenue N near Halladay Street that serves Metro Routes 5 and 16.

The routes within the study area provide service to and from the University District, Downtown Seattle, Northgate, Shoreline Community College, East Greenlake, Broadview, Whittier Heights, and Seattle Center. Some of the routes operate seven days per week while others operate only on weekdays or only during peak hours on weekdays. The headways range from 15 minutes at peak times on weekdays, to one hour on weekends.

The King County Metro Six-Year Transit Development Plan (updated February 2002) suggests increased service route. The Dexter Avenue corridor is a possible candidate for increased evening service by year 2007.

2.12. Non-Motorized Transportation Facilities

As described in the *Roadway Network* section, most roadways in the study area have concrete sidewalks. The exception is 4th Avenue N, which has a combination of non-separated asphalt walkways, concrete sidewalks, and no walkway. There is a sidewalk on the west side of the road between Newell Street and Queen Anne Drive; however, it is not separated by a curb. On the east side of the road, there is a sidewalk between Newell Street and the south edge of the condominium property. There is a rolled curb and an asphalt walkway between the condominium property and just north of Queen Anne Drive. There are no pedestrian amenities on the east side of 4th Avenue N immediately south of Queen Anne Drive. The City of Seattle provides an adult crossing guard at the Queen Anne Drive/4th Avenue N/Raye Street intersection in the morning from about 8:00 to 8:30 A.M. and in the afternoon from about 2:45 to 3:30 P.M. on school days. There are no plans to modify existing non-motorized transportation facilities in the vicinity of SCDS in 2006 or 2010 without the project.

3. IMPACTS OF PREFERRED ALTERNATIVE

The Preferred Alternative (Alternative 1) proposes the following improvements:

- Two new two to three-story academic buildings
- New parking areas
- A private access drive
- Renovated existing structures.

The project would be constructed in two phases with up to four to ten years between phases. The proposed project would expand the facilities from approximately 43,000 square feet of classroom and administrative space to 77,000 square feet. A 10,000 square-foot, single-story parking garage would also be constructed.

Phase 1 construction would include a new two to three-story middle school building, a new access driveway from 4th Avenue N that would provide space for on-site drop off and pick up and access to parking, and renovated existing facilities. The new Phase 1 building would house general classrooms; classrooms for science, art, and technology; a multi-purpose room; and a storage area. As part of Phase 1, five single-family homes owned by Seattle Country Day School would be demolished, and on-site parking would be increased from 29 to 54 spaces.

In Phase 2, another two to three-story building would be constructed to house classrooms and the administrative area. Construction of the Phase 2 building would remove a total of 23 on-site parking spaces, but would include a 29-car parking garage, for a total of 60 on-site parking spaces. One additional on-site handicapped-accessible parking space is planned for both Phase 1 and 2. Table 16 shows the on-site parking spaces by type. On-site general-use parking spaces would increase by 24 stalls with Phase 1 and 30 stalls with Phase 2.

Table 16. On-site Parking Spaces by Type

Type of Parking Space	Existing	Phase 1	Net Change from Existing	Phase 2	Net Change from Existing
General Use	26	50	+24	56	+30
Handicapped-Accessible	2	3	+1	3	+1
Bus	1	1	+0	1	+0
Total	29	54	+25	60	+31

3.1. Construction Impacts

The construction-related traffic impacts of the proposed action would vary throughout the construction process. Most construction activity and related impacts would occur within the project site boundaries. However, some activities will require use of the local roadways and intersections surrounding the site.

Information provided by a contractor familiar with similar projects indicates that approximately 545 dump truckloads would be required during Phase 1 based on cut and fill estimates, and about 140 dump truckloads during Phase 2. Because the adjacent roadways are narrow, only solo dump trucks are anticipated to be used at this site. Solo dump trucks carry approximately 12 cubic yards (cy) of material. The heaviest construction impacts are expected to occur in a two-month period during excavation. Most

of the dump truckloads are expected to occur in a four-week period for each phase. An estimated 100 to 150 additional trucks would be required to bring in asphalt and concrete during paving of the new parking lots and the new access drive. These truck trips would be required intermittently throughout the project. Assuming the 545 truckloads occur over a four-week period (approximately 20 working days) for Phase 1 and 140 truckloads for Phase 2, the effort would require an average of approximately 27 truckloads per day for Phase 1 and seven (7) truck loads per day for Phase 2. Each truckload would generate two trips (one inbound and one outbound). Assuming transportation occurs over eight hours each workday, the excavation efforts would generate an average of about seven (7) truck trips per hour during Phase 1 and about two (2) truck trips per hour during Phase 2. Trucks volumes would be about the same during paving elements of the project.

The construction of the project would also require employees and equipment that would generate traffic to and from the site. Based on information provided by the contractor, construction at the site is expected to occur from 7:00 A.M. to 5:00 P.M. Monday through Friday. It is anticipated that construction workers would arrive at the construction site before the AM peak traffic period on local area streets. Construction workers could add to the PM peak period if the shift ends at 5:00 P.M. The number of workers at the project site at any one time would vary depending upon the nature and construction phase of the project. Current estimates indicate the average number of construction employees on site during the first three months of each phase would be approximately 30. After the earthwork and foundation are complete, the number could peak to about 60 employees during some phases such as finish work.

Based on these estimates, the proposed project would likely generate a noticeable amount of construction traffic on surrounding roadways. Trucks carrying material from the site would be most noticeable. According to the contractor, trucks are anticipated to use 4th Avenue N to access the site. Most trucks would likely be coming from and going to Aurora Avenue or Dexter Avenue (via 6th Avenue N). Although the truck traffic would be noticeable, the increase would represent about 4% of overall midday traffic volumes on 4th Avenue N. The truck traffic is not expected to degrade operations of study area intersections during off-peak hours and impacts during peak hours are expected to be reduced since construction transportation is typically reduced during these times.

A construction management plan (CMP) addressing traffic and pedestrian control would be prepared to address truck routes, lane closures, and sidewalk closures (if required). To the extent possible, the CMP should direct trucks away from local access streets to avoid unnecessary conflicts with resident and pedestrian activity.

The presence of a temporary construction work force could also increase the demand for study area parking. Construction workers are expected to park on-site during the summer, but would park off-site when school is in session. As described above, construction workers could peak at 60 employees. Assuming each worker drives alone to the site, approximately 60 additional vehicles would be generated that would need to park. As discussed in the *Affected Environment's Parking* section, on-street parking in the site's immediate vicinity is expected to be 89% utilized in the future without the proposed project during the peak afternoon time period when school is in session. Therefore, construction workers should not be allowed to park on-street in the site vicinity on weekdays when school is in session. The contractor should secure available off-site parking and shuttle employees to the site. Potential off-site parking locations could include a local business or church that has excess parking during daytime hours.

Construction of Phase 2 is expected to cause some on-site parking to be temporarily unavailable. This condition would likely occur for one school year during construction of that phase. SCDS plans to secure off-site parking spaces to replace those that would be temporarily unavailable and have SCDS staff park at the off-site parking location. If the off-site parking is located too far away for staff to walk to school, then SCDS would provide a shuttle between the off-site parking location and the school.

3.2. Roadway Network

The Preferred Alternative would include frontage improvements on 4th Avenue N adjacent to the project site. These improvements would likely include sidewalk, curb, gutter, landscaping, and on-street parking enhancements. The Preferred Alternative also includes improving Nob Hill Avenue N, south of Newell Street, with a turnaround at the south end. The turnaround would enhance circulation on Nob Hill Avenue N and would connect to a new private east-west access drive that would be used by SCDS for pick up and drop off. SCDS proposes to prepare a coning plan that would allow school access from 4th Avenue N only during morning drop off and afternoon pick up. Because no direct SCDS access would be available, no pick-up and drop-off is anticipated to occur on Nob Hill Avenue N.

3.3. Traffic Volumes

According to SCDS officials, there are no plans to increase student enrollment or faculty/staff at SCDS in the future once the planned reorganization is complete. Therefore, the trip generation described previously in the *Affected Environment* section for a student population of 328 students and 61 faculty/staff is expected to remain essentially the same for the future-with-project conditions. Five on-site single-family houses owned by SCDS would be demolished with the project. Four of those homes are currently rented and generate trips that are not related to the school. With the removal of the houses, the overall on-site trip generation would decrease by about 40 daily trips (three occurring in the AM peak hour and none in the School PM peak hour).

The school's trip assignment could shift with the proposed private access drive. The new drive would provide more on-site space for queuing and would be accessible from both the north and south on 4th Avenue N (northbound left turns into the site would be allowed). This improvement could shift some drivers that currently circulate through the neighborhood to access the end of the queue back to 4th Avenue N. This could reduce some school-related trips on Queen Anne Drive west of 4th Avenue, on Warren Avenue N between Queen Anne Drive and Newell Street, and on Newell Street between Warren Avenue N and 4th Avenue N. As noted in *Comparison of Additional Traffic Counts,* it is possible that the number of existing SCDS trips traveling through the neighborhood may be higher than presented in this report. If this is true, the proposed access drive could shift more existing trips than previously expected, thus creating a larger net reduction in trips on this route.

Although student enrollment is not planned to increase with the project, school enrollment does change over time due to organizational and operational changes that are made independent of physical changes to facilities. As background information, a sensitivity analysis was performed to determine potential transportation impacts from increases in student enrollment. This analysis is presented at the end of this section.

3.4. Traffic Operations

Because the student enrollment and staff are not expected to increase in the future with the proposed redevelopment project (in addition to the planned reorganization), the 2006 and 2010-with-project levels of service would be the same as described for the 2006 and 2010-without-project conditions in the *Affected Environment* section.

3.5. Drop-off and Pick-up Operations

In 2006 and 2010 with the project, drop off and pick up would continue on 4th Avenue N with the addition of a private drive that would connect 4th Avenue N and Nob Hill Avenue N. The drive would be approximately 230 feet long and would connect to a turn around at the south end of Nob Hill Avenue. The proposed drop-off and pick-up area would be located on the south side of the new drive near the east end. Parents would enter the drive on 4th Avenue N (from the north and south), proceed west to the turn around, drive around to the east to the drop-off/pick-up area. Because parents could queue on the north and south sides of the drive and through the turn around, the new drive is expected to accommodate approximately 29 vehicles (assuming 20 feet per queued vehicle) at one time. This would more than quadruple the on-site queuing space compared to existing conditions, which is expected to dramatically reduce the number of school-related vehicles queued on the adjacent streets on an average school day. As mentioned previously, the observed peak afternoon queue was about 30 vehicles, and the queue could grow in the future without the project to about 37 vehicles (7 on site and 30 on street). The peak queue is not expected to increase with the proposed project, since no additional increases in student enrollment and faculty/staff are proposed with the project. Based on this information, the peak on-street queue in the future with the project could be about eight vehicles—a reduction of about 22 vehicles queued on street at one time—assuming the school continues to load one vehicle at a time. If the school began loading more than one vehicle at a time, the peak queue could be reduced. No adverse traffic circulation or roadway impacts are expected due to the new drive, and pick-up and drop-off conditions are anticipated to be greatly enhanced.

3.6. Site Access

SCDS' four access driveways on 4th Avenue N would be reduced to three with the Preferred Alternative. The two southernmost driveways would be removed with the construction of the new middle school building. The inbound center driveway to the drop-off/pick-up loop would remain and would provide access to about seven surface parking spaces. The existing northernmost school driveway would also remain and would provide access to the new private access drive proposed with the project. The new access drive would provide access to parking spaces located along the access drive and at the west side of the school with Phase 1, and to structured parking with Phase 2. A new access driveway would be located further to the north on 4th Avenue N, and would provide access to 14 surface parking spaces.

A new access driveway is planned on Nob Hill Avenue N that would provide vehicular access to the school. This access is proposed to be coned off on Nob Hill Avenue N during morning drop-off and afternoon pick-up activities in order to limit such activities to the new private drive's access on 4th Avenue N.

3.7. Parking

The Preferred Alternative would increase SCDS' on-site parking supply from 29 spaces to 54 spaces with Phase 1 (50 general-use parking spaces, three handicapped-accessible spaces, and one bus space) and to 60 spaces with Phase 2 (56 general-use parking spaces, three handicapped-accessible spaces, and one bus space). As mentioned previously in Table 16, SCDS' average daily peak parking demand is estimated to be 62 vehicles in the future with the planned reorganization. Since no additional faculty/staff and student enrollment increases are expected with the project, no increase to the average-day parking demand is anticipated. Based on the planned increase in on-site parking, the number of school-related vehicles parking on street is expected to decrease with the project. Based on the number of existing on-site general-use parking spaces, approximately 36 school-related vehicles are expected to

park on-street during the noon and mid-afternoon time periods in the future without the proposed redevelopment project. With the project, the number of vehicles parked on-street is expected to reduce to about 12 vehicles with Phase 1 and to about six (6) vehicles with Phase 2 during these time periods based on the planned increase in general-use, on-site parking. Utilization during the evening peak is not likely to change since that is related to residential use in the area.

The project would reduce the number of curb cuts on 4th Avenue N from four to three, but would add a driveway on Nob Hill Avenue N. Since the total number of curb cuts would remain the same, the number of on-street parking spaces is not expected to change in the future with the project. Because the Preferred Alternative would increase the number of on-site parking spaces, and on-street parking supply in the site vicinity is expected to remain the same, the project is anticipated to improve parking conditions in the study area for typical everyday conditions.

3.8. Charter Bus Operations

With the Preferred Alternative, charter buses would use the new private access drive to stage, load, and unload students on the SCDS site. Buses would likely enter the new drive from Nob Hill Avenue N, proceed to the east on the private access drive, load and/or unload students, and exit the site to the north on 4th Avenue N. This improvement would remove the need for buses to stage on Newell Street and Nob Hill Avenue N and block existing travel lanes.

3.9. Delivery Operations

With the Preferred Alternative, all delivery trucks would access the site via the new private access drive. Truck drivers are expected to enter the new drive from 4th Avenue N, proceed west on the private access drive to deliver their goods, and then small trucks could turn around and exit the site to the east via 4th Avenue N. Larger trucks may exit the site via Nob Hill Avenue N. The new access drive would eliminate the need for trucks to back southbound on Nob Hill Avenue N on a daily basis.

3.10. Event Conditions

Spectator events at SCDS with the Preferred Alternative would be similar to those that currently occur on site. According to SCDS staff, the sizes of special events at SCDS with the project are expected to remain essentially the same in the future with the development proposal. Because there will be a new "multi-purpose" space, it is anticipated that up to three additional events could be held on site each year. The "multi-purpose" space is planned to seat about 120 persons. Assuming an average vehicle occupancy rate of 2.0 persons per vehicle, an event in the new space could generate about 60 parked vehicles. Approximately 90% of this parking demand could be accommodated on site with the increased parking provided in Phase 1 and 100% with Phase 2.

The additional on-site parking is expected to reduce the on-street parking associated with existing SCDS special events. Approximately 24 additional vehicles would be able to park on site in general-use parking stalls in Phase 1 and up to 30 additional vehicles with Phase 2. This would serve to reduce the overall on-street parking utilization during SCDS events. Therefore, no significant adverse impacts to on-street parking are anticipated due to special events at SCDS with the project.

3.11. Safety

The Preferred Alternative would reduce the total number of access driveways on 4th Avenue N from four to three. This reduction in driveways would reduce traffic and pedestrian conflicts along 4th Avenue N and improve overall safety conditions. The improved traffic flow during school drop-off and pick-up times may also enhance safety in the area by reducing U-turns that now occur as parents maneuver to get into the queue.

The Preferred Alternative would also add a driveway on the south end of Nob Hill Avenue N, which would provide vehicle access to the school. However, this driveway is planned to be coned off during the peak morning drop-off and afternoon pick-up time periods when school traffic volumes are highest. Since the driveway would only be open during low-volume time periods associated with the school, no safety concerns are expected due to the proposed driveway on Nob Hill Avenue N.

The new private access drive is expected to improve safety conditions on Newell Street and Nob Hill Avenue N. With the new access drive, buses would no longer need to stage on Newell Street and Nob Hill Avenue N and block existing travel lanes, and trucks would no longer need to back southbound on Nob Hill Avenue N to deliver food to the kitchen.

3.12. Transit Facilities and Service

The Preferred Alternative would not adversely impact any transit facilities or service. Few faculty and staff would ride Metro Transit to and from school with or without the redevelopment project.

3.13. Non-Motorized Transportation Facilities

The redevelopment project would include reconstructing the sidewalks along the 4th Avenue N property frontage. The project is not expected to increase the level of pedestrian activity that already occurs around the site. No adverse impacts to pedestrian or non-motorized facilities are anticipated.

3.14. Sensitivity Analysis

Although the student enrollment at SCDS is not proposed to increase due to the proposal, the City of Seattle requested that a sensitivity analysis be performed to determine potential impacts of student population growth at SCDS. There are five key transportation elements that could be impacted by an increase in student population:

- Traffic Operations at arterial intersections
- Traffic Volumes on Adjacent Access Streets
- Queuing During Drop-off and Pick-up
- On-street Parking
- Event Parking

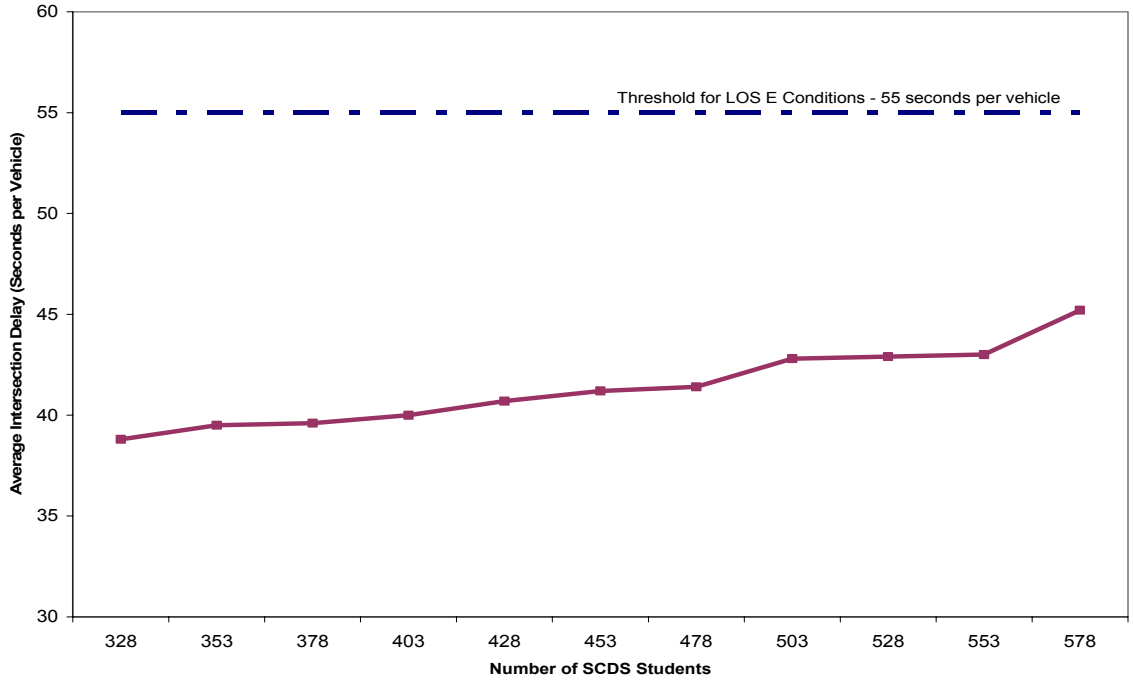
Potential impacts due to student population growth at SCDS for each of these elements are described below.

Traffic Operations

An increase in student enrollment at SCDS would generate additional vehicles that would travel through the two study area intersections. The Queen Anne Drive/4th Avenue N/Raye Street intersection has movements that are likely operating over capacity (LOS F) during the AM and School PM peak periods. Any additional trips generated by the school could adversely impact intersection operations, and would exacerbate queuing conditions on those movements with the highest traffic volumes (e.g., the westbound movement on Raye Street, and the eastbound and westbound movements on Queen Anne Drive).

The Nickerson Street/3rd Avenue N/Florentia Street intersection currently operates at LOS C during the AM and School PM peak periods. In 2010 without the project, the intersection is projected to operate at LOS D during the AM peak hour. LOS D conditions are acceptable to the City of Seattle. Figure 16 shows the average intersection delay at the Nickerson Street/3rd Avenue N/Florentia Street intersection during the AM peak hour in 2010 assuming student increases at SCDS in 25-student increments and existing travel modes. The intersection is not projected to operate at LOS E with any of the enrollment increases during the AM peak hour in 2010.

Figure 16. Potential AM Peak Hour Average Delay Increases at Nickerson St/3rd Ave N/Florentia Intersection in 2010



Source: Heffron Transportation, Inc. 2004

SCDS' impacts to traffic operations due to student enrollment increases could be mitigated by reducing the number of school-related vehicles traveling through these intersections. Mitigation measures to reduce school-related trips associated with student population increases could include:

- Increasing the number of students in each drop-off and pick-up vehicle, thereby reducing the number of vehicles traveling to and from the school,

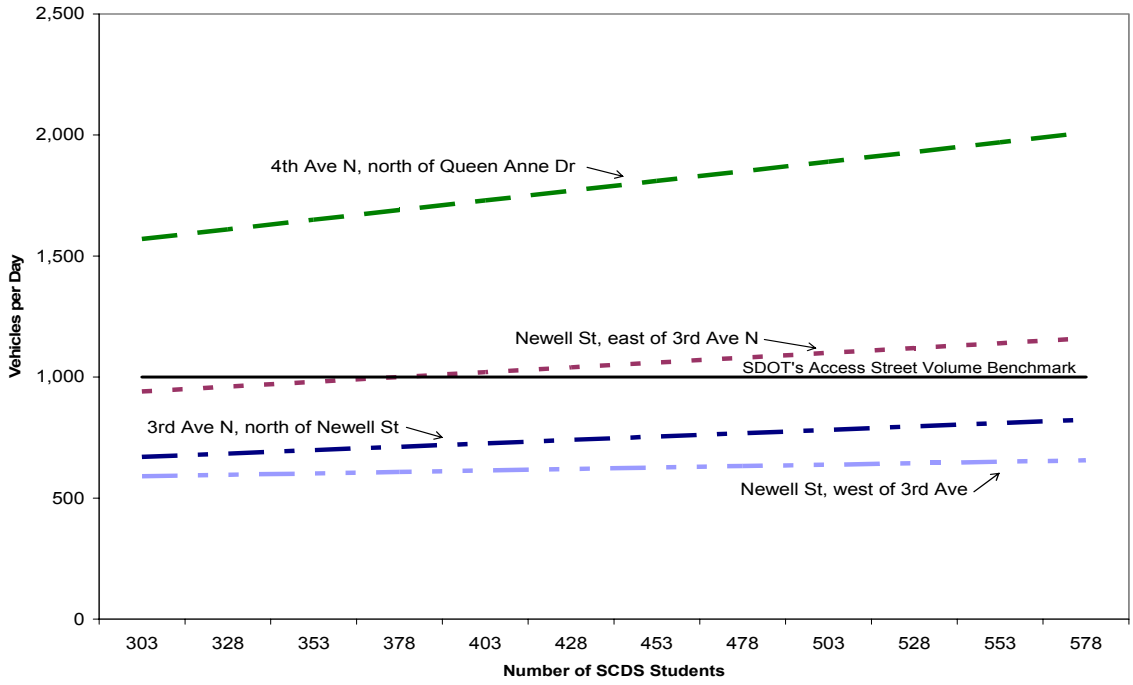
- Busing a portion of SCDS students to and from the school, which would also reduce the number of vehicles traveling to and from the school.

Traffic Volumes on Adjacent Access Streets

An increase in student enrollment at SCDS would generate additional vehicles that would travel on adjacent access streets. Figure 17 shows the projected increases in daily traffic volumes on 4th Avenue N, Newell Street, and 3rd Avenue N in 2010 assuming student increases at SCDS in 25-student increments and existing travel modes. As mentioned previously, SDOT considers daily volumes in excess of 1,000 vehicles as indicating that unusual conditions exist. Both 3rd Avenue N and Newell Street, west of 3rd Avenue N, are not expected to exceed this daily traffic volume threshold in 2010 with the student enrollment increases shown. Newell Street, east of 3rd Avenue would meet this threshold in 2010 with a student population of 378—50 students more than currently proposed with SCDS' planned reorganization. 4th Avenue N, north of Queen Anne Drive, currently exceed this threshold and would continue to do so with any increase in student population. It is possible that daily volumes on the section of 4th Avenue N between the school and Newell Street, and on Newell Street, between Nob Hill Avenue N and 4th Avenue N, also exceed 1,000 daily vehicles due to circulation effects around the school.

Potential SCDS impacts to traffic volumes on adjacent access streets due to student enrollment increases could be mitigated by reducing the number of school-related vehicles traveling through these intersections using mitigation measures such as those described for traffic operation impacts.

Figure 17. Potential Access Street Daily Traffic Volume Increases in 2010



Source: Heffron Transportation, Inc. 2004

Queuing During Drop-off and Pick-up

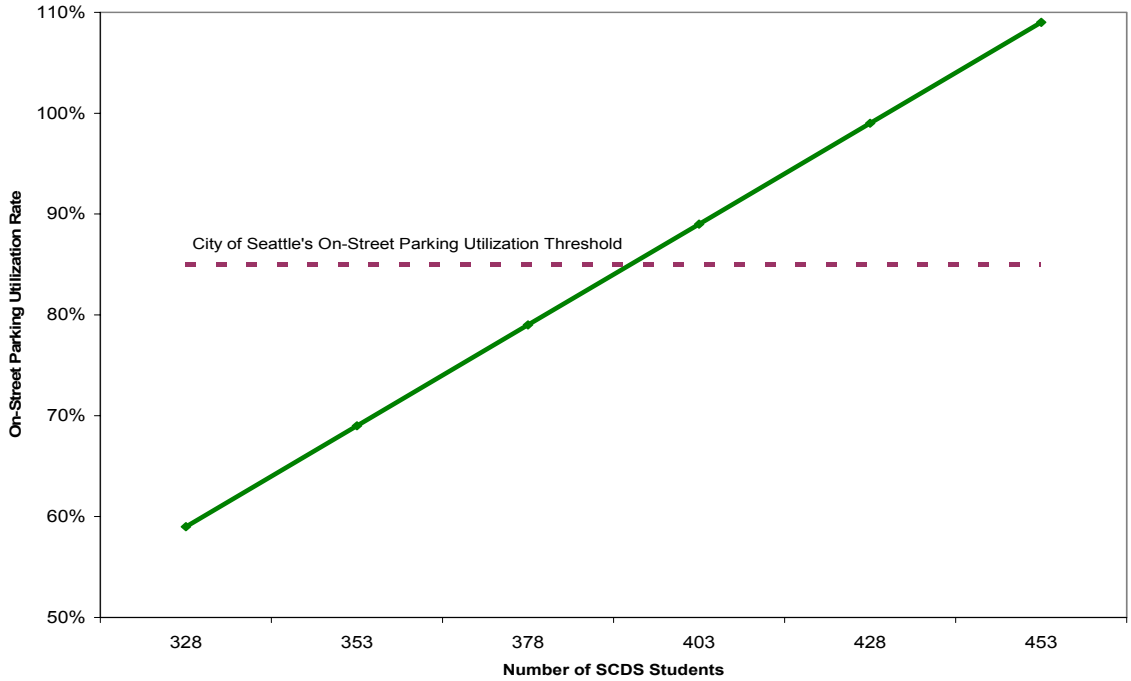
The number of vehicles that extend onto the adjacent access streets during drop-off and pick-up are expected to be significantly reduced with the proposal. This is due to increase in the number of vehicles that would be able to store on-site and the possibility of loading more vehicles at one time. Because an increase in student enrollment at SCDS would generate additional vehicles that could add to the queue during drop-off and pick-up, mitigation could be needed at some point in the future. Mitigation measures to reduce queuing during drop-off and pick-up could include:

- Increasing the number of drop-off and pick-up times so that fewer vehicles arrive at one time,
- Instituting multiple loading so that more vehicles are loaded at one time,
- Reducing overall school-related trips by increasing the number of students per vehicle and/or busing a portion of SCDS students to and from the school.

On-street Parking

The number of vehicles that park on-street near the school is expected to be reduced with the proposal. This is due to increased on-site parking spaces proposed. The City of Seattle generally considers peak on-street parking utilization rates below 85% to be acceptable. Figure 18 shows peak on-street parking utilization rates during the peak afternoon time period within the on-street parking utilization study area assuming student increases at SCDS in 25-student increments, existing travel modes, and 30 additional general-use, on-site parking spaces proposed with Phase 2 of the project. The peak on-street parking utilization rate is projected to exceed 85% with a student enrollment of about 390—an increase of 62 students over the 328 students assumed with the planned reorganization.

Figure 18. Potential On-Street Parking Utilization Increases



Source: Heffron Transportation, Inc. 2004

SCDS' impacts to on-street parking due to student enrollment increases could be mitigated by reducing the number of school-related vehicles parking near the site. Mitigation measures to reduce on-street parking could include:

- Providing more on-site parking,
- Increasing the number of drop-off and pick-up times so fewer vehicles are arriving at one time,
- Reducing overall school-related trips by increasing the number of students per vehicle and/or busing a portion of SCDS students to and from the school.

Event Impacts

The number of vehicles that park on-street near the school during special events is expected to be reduced with the proposal, due to the increase in on-site parking spaces proposed. Because an increase in student enrollment at SCDS could increase attendance at special events, and the number of vehicles parking on-street, mitigation could be needed at some point in the future. Mitigation measures to reduce event parking could include:

- Developing an Event Parking Management Plan that identifies specific actions when event parking is expected to exceed the available parking supply. These measures could include encouraging carpooling to events and/or securing off-site parking spaces and providing a shuttle between the school and the off-site parking location.

4. IMPACTS OF ALTERNATIVE 2

Alternative 2 is similar to the Preferred Alternative; however, an additional house would be demolished in Phase 2 so a lot-coverage variance would not be required. Because the house would be used by SCDS in Phase 1, the total site trip generation is expected to be the same as described for the Preferred Alternative. Therefore, the impacts for Alternative 2 would also be the same as described for the Preferred Alternative.

5. IMPACTS OF ALTERNATIVE 3 – NO ACTION

Alternative 3 would result in no changes to SCDS once the planned reorganization is complete. The transportation facilities and operations with this alternative were analyzed in detail as "without-project project conditions" and were presented in the *Affected Environment* section.

6. MITIGATION MEASURES

The proposed action alternatives are not expected to result in significant adverse impacts. However, several mitigation measures have been incorporated into the project alternatives as options to improve overall transportation and parking conditions in the site vicinity. Some or all of these mitigation measures could be included with any of the alternatives and include:

- Upon SDOT approval, implement a coning plan for the turnaround on Nob Hill Avenue N to limit access for pick-up and drop-off activities to the new private drive with access on 4th Avenue N.

- Prepare a construction management plan (CMP) that addresses truck traffic and pedestrian control. It would identify truck routes lane closures, and sidewalk closures, if any are required. To the extent possible, the CMP would direct trucks away from residential streets to avoid unnecessary conflicts with resident and pedestrian activity. In addition, off-site parking should be secured for construction workers, if construction occurs on weekdays when school is in session. The contractor should secure available off-site parking and shuttle employees to the site. Potential off-site parking locations could include a local business or church that has excess parking during daytime hours.

- Secure off-site parking for staff during construction of Phase 2 to replace on-site parking that would be temporarily unavailable. If the off-site parking is located too far away for staff to walk to school, then SCDS should provide a shuttle between the off-site parking location and the school.

- Continue to work with neighbors in forums like the current SCDS transportation advisory committee to address operational issues related to student drop-off and pick-up activities, parking, and special events.

- Prepare and implement an Operations Plan that could include surveys, observations, interviews, enforcement, or some other measure to ensure that transportation operations (such as student drop-off and pick-up activities, on-street parking, and school-related queuing) function effectively with the proposal.

7. SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

None of the project alternatives are expected to result in significant unavoidable adverse impacts to transportation facilities or operations.

APPENDIX 1

TRANSPORTATION SURVEY FORMS

Survey #_____

SCDS Transportation Survey for Faculty and Staff

Last Name: _____ **First Name**: _____

1. On what days of the week and at what times are you typically at school? (e.g. Monday thru Friday 8 A.M. to 4 P.M.) _____

2. How do you typically get to school each day? (**Read Carefully**, check **ONE** and answer any related questions)

   a. ☐ I drive alone. I usually park in the following location: _____

   b. ☐ I drive or ride in a carpool. There are usually _____ **other** SCDS faculty/staff/students in the car. We usually park in the following location: _____

   c. ☐ I am dropped off at school. There are usually _____ **other** SCDS faculty/staff/students dropped off with me.

   d. ☐ I walk to school.

   e. ☐ I bike to school.

   f. ☐ Other (Please describe) _____

3. Do you typically leave school using the travel mode described in Question #2? Yes☐ No☐ If "No", what travel mode do you typically use? _____

4. What route do you take **to school** in the morning? (See attached map to see routes)?

   ☐ Rt 1 – From Aurora North via 4th Ave
   ☐ Rt 2 – From Aurora North via Warren, Newell
   ☐ Rt 3 – From Aurora South via 4th Ave
   ☐ Rt 4 – From Aurora South via Warren, Newell
   ☐ Rt 5 – From 4th Avenue (to the south)
   ☐ Rt 6 – From east on Nickerson via 3rd Ave
   ☐ Rt 7 – From the west on Nickerson via 3rd
   ☐ Rt 8 – From Queen Anne Dr from the west via 4th
   ☐ Rt 9 – From Queen Anne Dr from the west via Warren
   ☐ Other (please describe) _____

   _____

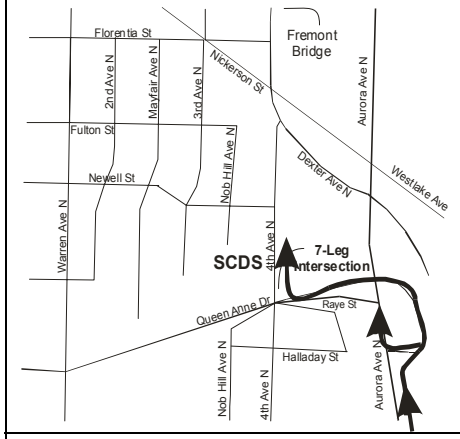
5. What route do you take **from school** in the afternoon? (See attached map to see routes)?

   ☐ Rt 1 – To Aurora North via 4th Ave
   ☐ Rt 2 – To Aurora North via Warren, Newell
   ☐ Rt 3 – To Aurora South via 4th Ave
   ☐ Rt 4 – To Aurora South via Warren, Newell
   ☐ Rt 5 – To 4th Avenue (to the south)
   ☐ Rt 6 – To east on Nickerson via 3rd Ave
   ☐ Rt 7 – To the west on Nickerson via 3rd
   ☐ Rt 8 – To Queen Anne Dr from the west via 4th
   ☐ Rt 9 – To Queen Anne Dr from the west via Warren
   ☐ Other (please describe) _____

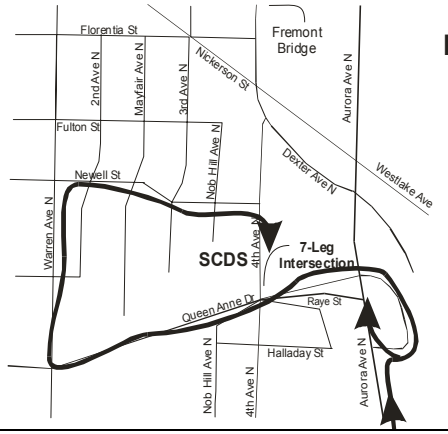
   _____

Thank you for your help with this survey!

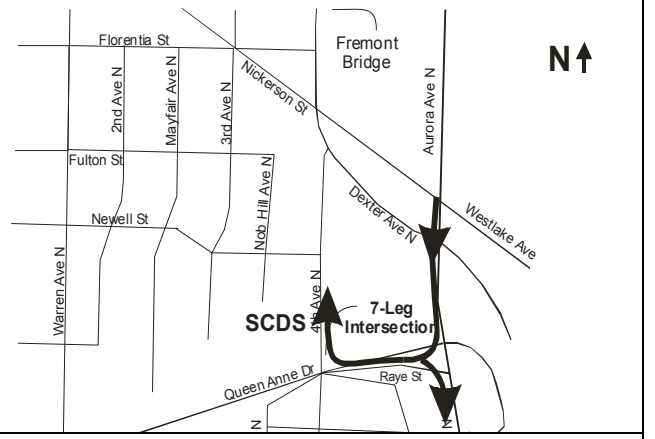
Route 1 – To/From Aurora North via 4th Ave



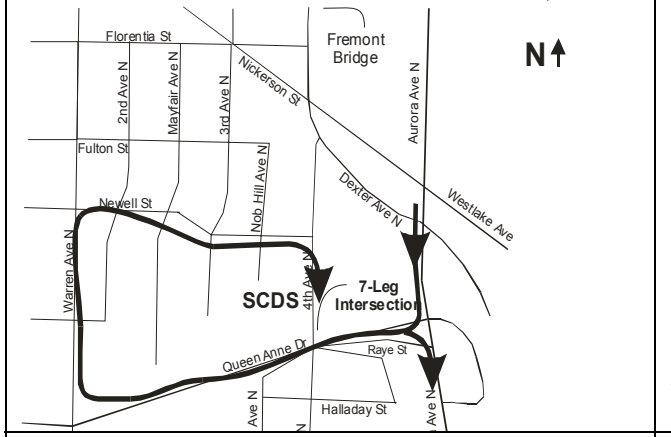
Route 2 – To/From Aurora North via Warren, Newell



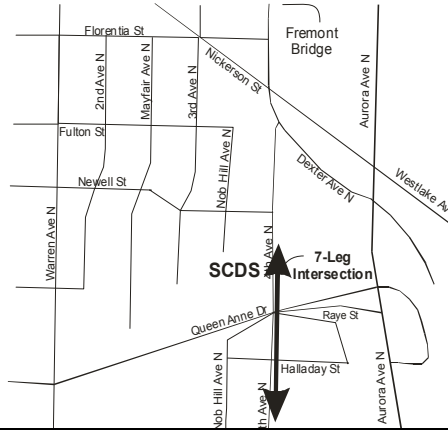
Route 3 – To/From Aurora South via 4th Ave



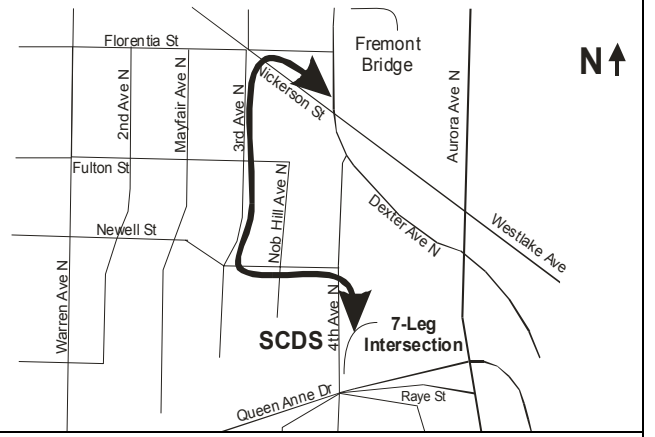
Route 4 – To/From Aurora South via Warren, Newell



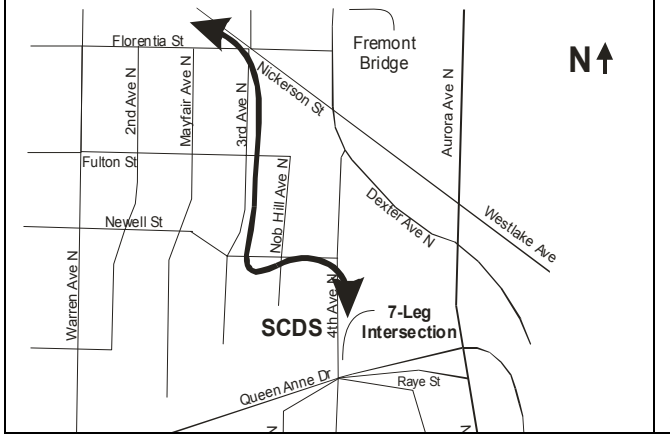
Route 5 – To/From 4th Ave (to the south)



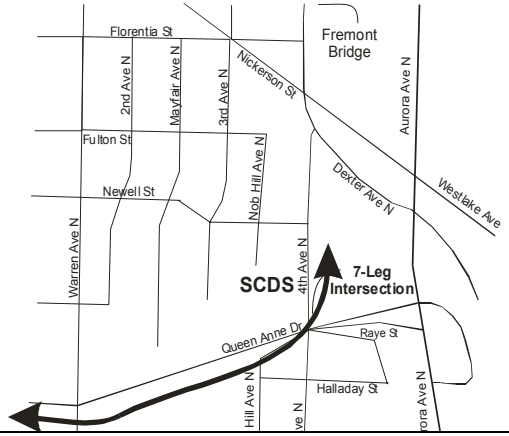
Route 6–To/From the east on Nickerson via 3rd Ave



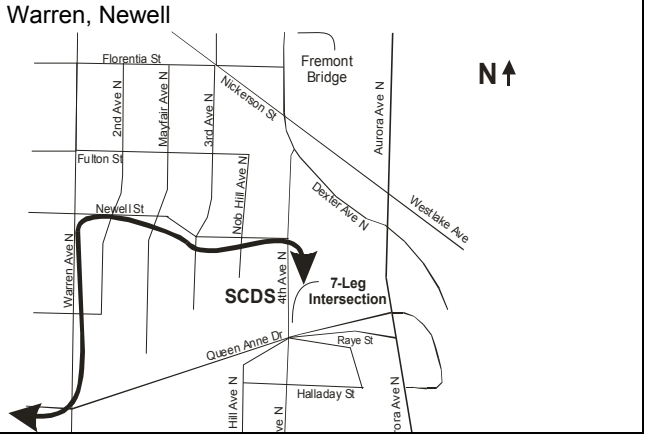
Route 7–To/From the west on Nickerson via 3rd Ave



Route 8–To/From Queen Anne Dr from the west via 4th



Route 9 – To/From Queen Anne Dr from the west via Warren, Newell



Survey #_____

SCDS Transportation Survey for Parents/Caregivers

Student Last Name: _____ **Student(s) First Name(s)**: _____

1. In what grade is your student(s)? _____

2. How does your student(s) typically get to school each day? (**Read Carefully**, check **ONE** and answer any related questions)

   a. ☐ They are dropped off at school. How many **other** SCDS students/faculty/staff are usually dropped off with them? _____

   b. ☐ They are driven to school by someone who parks (for the day) at school. How many **other** SCDS students/faculty/staff are usually driven with them? _____

   c. ☐ They walk to school.

   d. ☐ They bike to school.

   e. ☐ Other (Please describe) _____

3. Does your student(s) typically leave school using the travel mode described in Question #2? Yes☐ No☐ If "No", what travel mode do they typically use: _____
   _____

To School in the Morning:

4. At what time does your student(s) typically arrive at school? _____

5. What travel route is taken **to school** in the morning? (Routes are shown on attached map)?

   ☐ Rt 1 – From Aurora North via 4th Ave
   ☐ Rt 2 – From Aurora North via Warren, Newell
   ☐ Rt 3 – From Aurora South via 4th Ave
   ☐ Rt 4 – From Aurora South via Warren, Newell
   ☐ Rt 5 – From 4th Avenue (to the south)
   ☐ Rt 6 – From east on Nickerson via 3rd Ave
   ☐ Rt 7 – From the west on Nickerson via 3rd
   ☐ Rt 8 – From Queen Anne Dr from the west via 4th
   ☐ Rt 9 – From Queen Anne Dr from the west via Warren
   ☐ Other (please describe) _____
   _____

6. **If the student is dropped off** in the morning, what travel route is taken when **leaving school** in the morning?

   ☐ Rt 1 – To Aurora North via 4th Ave
   ☐ Rt 2 – To Aurora North via Warren, Newell
   ☐ Rt 3 – To Aurora South via 4th Ave
   ☐ Rt 4 – To Aurora South via Warren, Newell
   ☐ Rt 5 – To 4th Avenue (to the south)
   ☐ Rt 6 – To east on Nickerson via 3rd Ave
   ☐ Rt 7 – To the west on Nickerson via 3rd
   ☐ Rt 8 – To Queen Anne Dr from the west via 4th
   ☐ Rt 9 – To Queen Anne Dr from the west via Warren
   ☐ Other (please describe) _____
   _____

From School in the Afternoon:

7. At what time does your student(s) typically leave school? _____

8. **If the student is picked up** in the afternoon, what travel route is taken when coming **to school** in the afternoon?

☐ Rt 1 – From Aurora North via 4th Ave
☐ Rt 2 – From Aurora North via Warren, Newell
☐ Rt 3 – From Aurora South via 4th Ave
☐ Rt 4 – From Aurora South via Warren, Newell
☐ Rt 5 – From 4th Avenue (to the south)
☐ Rt 6 – From east on Nickerson via 3rd Ave
☐ Rt 7 – From the west on Nickerson via 3rd
☐ Rt 8 – From Queen Anne Dr from the west via 4th
☐ Rt 9 – From Queen Anne Dr from the west via Warren
☐ Other (please describe) _____

_____

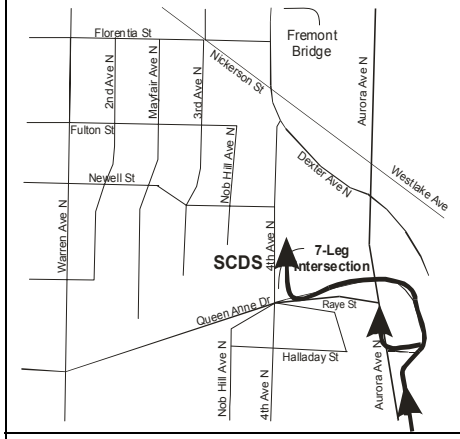
9. What travel route is taken **leaving school** in the afternoon?

☐ Rt 1 – To Aurora North via 4th Ave
☐ Rt 2 – To Aurora North via Warren, Newell
☐ Rt 3 – To Aurora South via 4th Ave
☐ Rt 4 – To Aurora South via Warren, Newell
☐ Rt 5 – To 4th Avenue (to the south)
☐ Rt 6 – To east on Nickerson via 3rd Ave
☐ Rt 7 – To the west on Nickerson via 3rd
☐ Rt 8 – To Queen Anne Dr from the west via 4th
☐ Rt 9 – To Queen Anne Dr from the west via Warren
☐ Other (please describe) _____

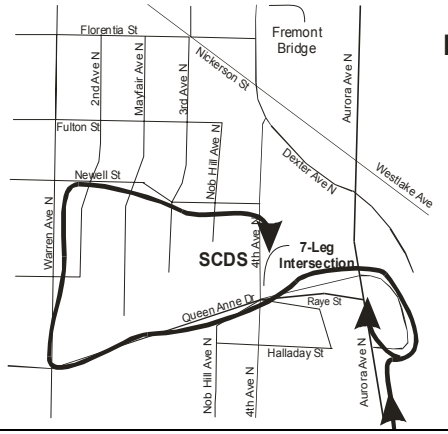
_____

Thank you for your help with this survey!

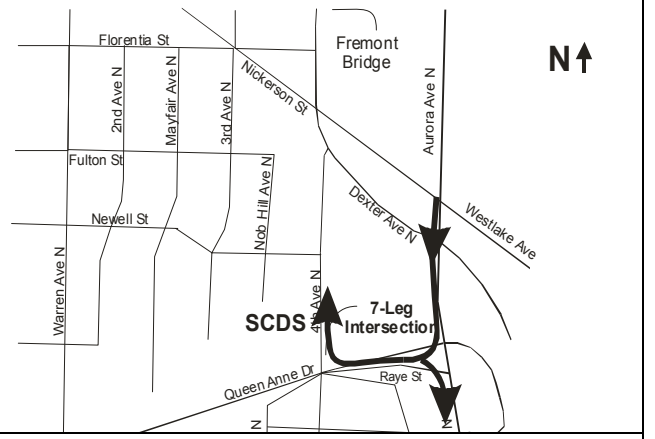
Route 1 – To/From Aurora North via 4th Ave



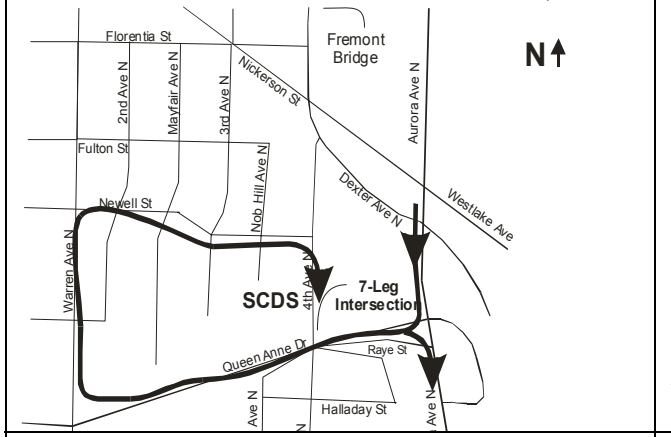
Route 2 – To/From Aurora North via Warren, Newell



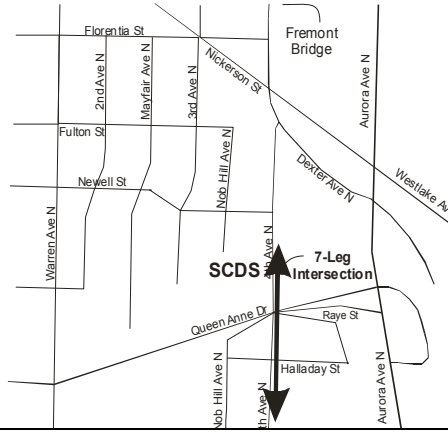
Route 3 – To/From Aurora South via 4th Ave



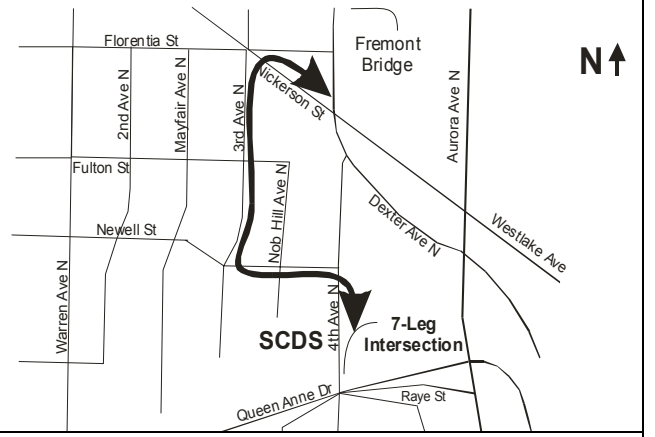
Route 4 – To/From Aurora South via Warren, Newell



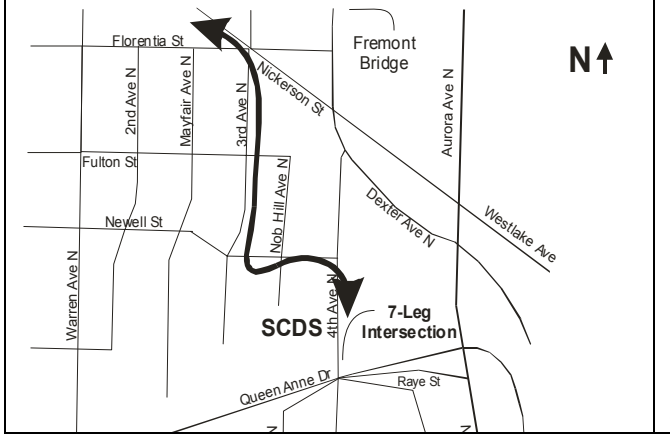
Route 5 – To/From 4th Ave (to the south)



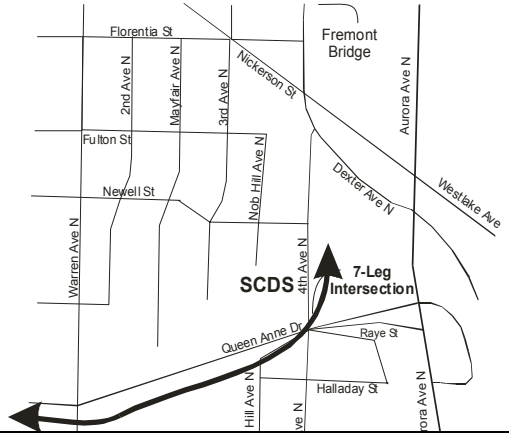
Route 6–To/From the east on Nickerson via 3rd Ave



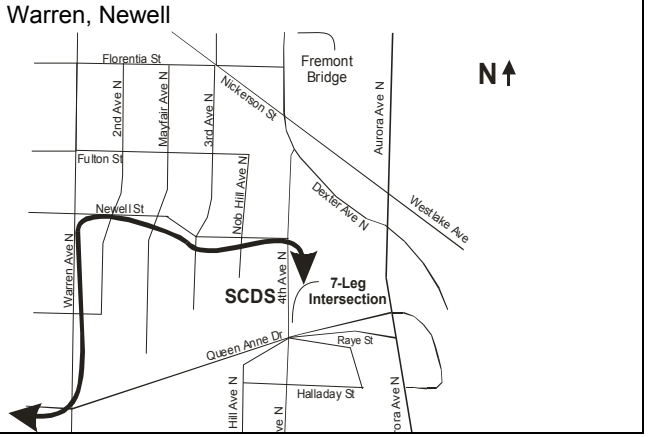
Route 7–To/From the west on Nickerson via 3rd Ave



Route 8–To/From Queen Anne Dr from the west via 4th



Route 9 – To/From Queen Anne Dr from the west via Warren, Newell



APPENDIX 2

PARKING DATA

Seattle Country Day School

On-Street Parking Demand and Supply - Noon Time Period

Parking Demand Counts were performed on Wednesday, March 5, 2003 and Thursday, March 6, 2003

Segment	Street Name	Street Segment	Side of Street	Total Parking Supply	On-Street Parking Demand	
					Wed	Thurs
A	3rd Avenue N	North of Newell Street	W	6	4	4
B	3rd Avenue N	North of Newell Street	E	3	0	1
C	Nob Hill Avenue N	North of Newell Street	W	5	4	4
D	Nob Hill Avenue N	North of Newell Street	E	7	3	4
E	Newell Street	West of 3rd Avenue N	N	2	0	0
F	Newell Street	West of 3rd Avenue N	S	3	1	2
G	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	N	3	0	0
H	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	S	2	1	1
I	Newell Street	Between Nob Hill Ave N and 4th Avenue N	N	8	1	5
J	Newell Street	Between Nob Hill Ave N and 4th Avenue N	S	5	5	4
K	3rd Avenue N	South of Newell Street	W	4	2	3
L	3rd Avenue N	South of Newell Street	E	9	4	3
M	Nob Hill Avenue N	South of Newell Street	W	4	2	3
N	Nob Hill Avenue N	South of Newell Street	E	6	4	3
O	4th Avenue N	Between Queen Anne Drive and Newell St	W	12	8	9
P	4th Avenue N	Between Queen Anne Drive and Newell St	E	7	0	2
Q	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	N	7	3	3
R	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	S	0	0	0
S	Raye Street	Between Nob Hill Ave N and 4th Avenue N	S	7	0	0
T	4th Avenue N	Between Raye Street and Halladay Street	W	0	0	0
U	4th Avenue N	Between Raye Street and Halladay Street	E	0	0	0
			Total	**100**	42	51

Average Parking Demand 47

Average Existing On-Street Parking Utilization 47%

Seattle Country Day School

On-Street Parking Demand and Supply - Mid-Afternoon Time Period

Parking Demand Countswere performed on Wednesday, March 5, 2003 and Thursday, March 6, 2003

Segment	Street Name	Street Segment	Side of Street	Total Parking Supply	On-Street Parking Demand	
					Wed	Thurs
A	3rd Avenue N	North of Newell Street	W	6	3	3
B	3rd Avenue N	North of Newell Street	E	3	1	1
C	Nob Hill Avenue N	North of Newell Street	W	5	4	7
D	Nob Hill Avenue N	North of Newell Street	E	7	3	7
E	Newell Street	West of 3rd Avenue N	N	2	0	0
F	Newell Street	West of 3rd Avenue N	S	3	4	4
G	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	N	3	4	3
H	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	S	2	4	1
I	Newell Street	Between Nob Hill Ave N and 4th Avenue N	N	8	8	7
J	Newell Street	Between Nob Hill Ave N and 4th Avenue N	S	4	7	9
K	3rd Avenue N	South of Newell Street	W	4	2	3
L	3rd Avenue N	South of Newell Street	E	9	4	3
M	Nob Hill Avenue N	South of Newell Street	W	4	5	6
N	Nob Hill Avenue N	South of Newell Street	E	6	4	5
O	4th Avenue N	Between Queen Anne Drive and Newell St	W	12	12	11
P	4th Avenue N	Between Queen Anne Drive and Newell St	E	7	3	9
Q	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	N	7	3	6
R	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	S	0	0	0
S	Raye Street	Between Nob Hill Ave N and 4th Avenue N	S	7	0	0
T	4th Avenue N	Between Raye Street and Halladay Street	W	0	0	0
U	4th Avenue N	Between Raye Street and Halladay Street	E	0	0	0
			Total	**99**	71	85

Average Parking Demand 78

Average Existing On-Street Parking Utilization 79%

Seattle Country Day School

On-Street Parking Demand and Supply - Evening Time Period

Parking Demand Countswere performed on Wednesday, March 5, 2003 and Thursday, March 6, 2003

Segment	Street Name	Street Segment	Side of Street	Total Parking Supply	On-Street Parking Demand	
					Wed	Thurs
A	3rd Avenue N	North of Newell Street	W	6	4	4
B	3rd Avenue N	North of Newell Street	E	3	0	2
C	Nob Hill Avenue N	North of Newell Street	W	5	6	5
D	Nob Hill Avenue N	North of Newell Street	E	7	7	6
E	Newell Street	West of 3rd Avenue N	N	2	0	0
F	Newell Street	West of 3rd Avenue N	S	3	2	3
G	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	N	3	1	1
H	Newell Street	Between 3rd Avenue N and Nob Hill Ave N	S	2	0	0
I	Newell Street	Between Nob Hill Ave N and 4th Avenue N	N	8	3	2
J	Newell Street	Between Nob Hill Ave N and 4th Avenue N	S	5	4	3
K	3rd Avenue N	South of Newell Street	W	4	4	3
L	3rd Avenue N	South of Newell Street	E	9	4	4
M	Nob Hill Avenue N	South of Newell Street	W	4	2	2
N	Nob Hill Avenue N	South of Newell Street	E	6	2	2
O	4th Avenue N	Between Queen Anne Drive and Newell St	W	12	2	3
P	4th Avenue N	Between Queen Anne Drive and Newell St	E	7	0	0
Q	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	N	7	3	3
R	Queen Anne Drive	Between Nob Hill Ave N and 4th Avenue N	S	0	0	0
S	Raye Street	Between Nob Hill Ave N and 4th Avenue N	S	7	2	1
T	4th Avenue N	Between Raye Street and Halladay Street	W	0	0	0
U	4th Avenue N	Between Raye Street and Halladay Street	E	0	0	0
			Total	**100**	46	44

Average Parking Demand 45

Average Existing On-Street Parking Utilization 45%